THE

PRINCIPLES OF NURSING

BY

CHARLOTTE A. BROWN, R.N.

SUPERINTENDENT OF NURSES IN THE NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN; GRADUATE OF BOSTON CITY HOSPITAL AND BOSTON LYING-IN HOSPITAL TRAINING SCHOOL FOR NURSES; LATE INSTRUCTOR IN THE BOSTON CITY HOSPITAL TRAINING SCHOOL FOR NURSES; LATE SUPERINTENDENT OF NURSES IN THE HARTFORD HOSPITAL TRAINING SCHOOL FOR NURSES, HARTFORD, CONNECTICUT

Illustrated

PREFACE.

In the preparation of this volume the author has tried to adhere *strictly to the principles of nursing.*

In all departments of education the advantage of carefully graded instruction is now universally accepted, and her years of experience in teaching have emphasized in the author's mind the need of a concise and understandable text-book. Consequently, clearness and simplicity have been her aim.

For example, the subject of bacteria is confined to a short but practical chapter, in which their growth, various products and wide distribution, together with accepted methods for their destruction, have been given. Again, though a discussion of the chemistry of foods and the unsettled subjects of digestion, assimilation and metabolism are avoided, a simple classification of diets and their special application to various disease conditions and the process of repair are given.

The clinical features are emphasized throughout. Instruction in observing and recording the patient's condition, nursing in various disease conditions, surgical dressings and operating-room technic are fully and carefully explained.

While the book is essentially elementary, the text covers the general fundamental principles of nursing. Hence its title, *A Text-book of the Principles of Nursing.*

A glossary is conveniently placed at the end of the book.

C. A. B.

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PRINCIPLES OF NURSING.

CHAPTER I.

QUALIFICATIONS.

Physical, Mental and Moral Qualifications of the Nurse—The Ethical Relation of the Nurse to the Patients and Their Friends—To Her Superior Officers—Hospital Staff—Fellow Workers—Her Duty to Herself.

"THE development of sick-nursing has brought into existence a large, highly skilled, and organized profession. It is one of the most notable features of modern social life."

Women whose ambition it is to enter this profession should consider their personal qualifications. The desire to be a nurse and the willingness to submit to strict discipline and perform hard work, while of utmost importance, are not all that is necessary.

There must always be an element of self-sacrifice, effacement and an appreciation of the seriousness of the work. There is no class of persons who come so close to the tragedies of life as does the nurse, consequently she should be a woman of sterling qualities.

The qualifications are good health, both physical and moral, and a well-trained mind.

Physical efficiency consists of being free from all organic diseases, all infirmities, peculiarities, and defects (including enlarged glands, tonsils or adenoids, defective teeth, and feet weakened or broken down); the candidate should be in possession of faultless sight and hearing, and sufficient strength and endurance to make the best use of her possessions.

The mental qualifications are intelligence, common-sense, perception, adaptability, discernment, executive ability, cheerfulness, and tact. The last is a rare asset, and has been defined as "not the quality by which you please, but by which you seldom offend."

A certain amount of education and mental training is indispensable. This does not necessarily mean a high degree of education though that is always to be desired, as it is true that the educated woman, who has the power of application, finds in her work much more that is of interest, and is able to perform it better, more easily, and more understandingly than the woman whose mind is untrained.

Mental training is that training received in school, home life, or business, which enables one to think for one's self; to be discreet; to possess judgment; to be able to observe and study intelligently; to know instinctively the right thing to do or the right decision to make; to know how to receive merited criticism and profit by it.

The moral qualifications are those of any God-fearing, self-respecting woman.

Ethics is that branch of philosophy which deals with human character and conduct so far as they

depend upon certain general principles, which include the conception of duty, honor, loyalty, truth, responsibility, and justice.

The Ethical Relation of the Nurse to the Patients and Their Friends.—To the patients she should be faithful, devoted, and a tireless servitor. She should be willing to give to them the best she has to give, regardless of color, creed, or social standing. She should forgive their ignorance and forget their faults, remembering only that they are human beings, and that they are helpless and ill.

To their friends she should ever be courteous and considerate, helping them when possible, and in every way try to make their burdens lighter.

Superior Officers.—To her superior officers she owes deference and loyalty in the fullest sense of the terms, and an obedience that is prompt, unquestioned, and absolute.

Her relations with the hospital staff should be purely professional. To them she owes allegiance, and she must remember that her profession supplements that of medicine: that her part is to help, and not to criticise nor suggest.

To her fellow-workers she should be at all times courteous, helpful, without being officious, and should respect their privileges and pleasures.

A Nurse's Duty to Herself.—The necessity for perfect health is obvious, consequently the fundamental rules of hygiene must be observed, including proper food, rest, sleep, fresh air, and outdoor exercise and recreation, which should never mean strenuous effort.

She should cultivate or develop any talent she may possess, which is not only a diversion, but may also serve as a recreation, for it has been truly said that "rest is not in cessation from work but in change of work."

She should keep up a general interest in the things which are happening in the world, and not allow herself to become self-centered, dull, or uninteresting—in fact, she must at all times be true to herself.

CHAPTER II.

PERSONAL HYGIENE.

Food and Drink—Clothing—Care of the Feet and Hands—Bathing —Exercise—Recreation—Sleep.

HYGIENE is the science of preserving health. On the personal or individual side it involves the consideration of the character of the food and beverages; of the clothing; of work, exercise, and sleep; of personal cleanliness, of special habits, such as the use of alcohol, drugs, etc.; and the control of various passions.

Since an important factor in the efficiency of a nurse is her health, it follows that everything which may in any way influence this should be looked after with the greatest care. It is unreasonable to expect the same amount, quality of work and power of endurance in the girl of eighteen or twenty years as in the fully matured woman; also the young are more susceptible to infections of all kinds. As a rule, the city-bred woman is better able to stand the confinement, close application, and hard work than the country-bred girl, who is, more or less, accustomed to outdoor life and freedom, the deprivation of which is very trying, and in some cases may entirely disqualify her for hospital work.

The ideal nurse is the one who can resist influences

which may depress mentally or physically, and who has the power to endure fatigue.

After entering the training school, much of the individuality and independence of the young woman are lost.

Her living conditions, food, clothing, to a certain extent; hours for work, sleep, and recreation are fixed for her without individual preference.

Food.—For people who are in good health there are two rules which should be observed in regard to their food: One is to choose the varieties which "agree" with them and avoid those which they cannot digest and assimilate without harm, and the other is to use only such foods and in such quantities as will afford sufficient nourishment and maintain the normal body energy and weight.

Drink.—It has been estimated that about 80 ounces of fluid should be taken during the twenty-four hours by the average adult person. A considerable portion of this should be taken as food. Water forms the principal part of the blood; it holds in solution and distributes the products of digestion, and is the medium by which waste material is carried from the body. It is a well-known fact that most people take too little fluid, and this is especially true of women.

Coffee should be used in moderate amounts, and when properly taken is probably of benefit to the adult. It contains an alkaloid, caffein, which acts as a mild stimulant without producing disagreeable after-effects; also, it does not incapacitate one for labor. It diminishes tissue waste and gives a feeling of rest after

exhausting mental or physical effort. For this reason, and because it permits the performance of excessive labor upon a limited diet, it is often taken in excess. When tolerance has been established or a habit formed, coffee is no longer of value, but instead may become decidedly harmful.

Tea and cocoa have much the same effect as coffee with the exception that cocoa contains considerable nourishment.

Clothing.—The objects of clothing are to protect the body from the sun's rays, from the cold and from winds; from the rain and other forms of wet, and from mechanical, external injuries and discomforts; to conserve body heat and prevent interference with the natural functions of the skin.

In discussing the value of different materials for clothing, the two important factors to be considered are their power of conducting heat and of absorbing moisture.

The heat-conducting power of a garment does not wholly depend upon the material itself, but upon its texture. The looser the texture of a fabric, the greater the amount of air that is held in its meshes.

Dry air is a poor conductor of heat, consequently a loosely woven garment will feel warmer.

Wool, for the reason that it is usually woven into a cloth that is loose and porous, is a most valuable material for cold weather.

Cotton material, usually compact and non-porous, is not so valuable as wool in cold weather. However, when especially manufactured so that its texture

resembles that of woollen cloth, it is a fair substitute for wool.

Next to the texture of a material in importance is its color, and its power to absorb or reflect the sun's rays which are absorbed to the greatest extent by black, then in order the dark shades of blue, green, and red. Heat is reflected most by white, then the light shades of yellow, green, and blue.

In underclothing which is not exposed to the rays of the sun, the color is unimportant. Underclothing should be changed frequently (daily, if possible). It should, at least, be thoroughly aired overnight, and the same set should never be worn day and night.

Damp underclothes favor the development of certain parasitic skin diseases, the organisms of which can live only in conditions where heat and moisture are afforded.

Care of the Feet.—There is no part of the body more generally overworked and abused than the feet. The shoes should fit perfectly, yet they seldom do. In a well-made pair of shoes the inner sides should be nearly parallel and not diverge greatly when the wearer stands with the feet together. The outer side of the shoe should have a curve inward, and the toe should in no case be pointed. The greatest amount of comfort may be obtained from the low shoe, which neither interferes with the free action of the ankle nor constricts circulation. The heels should be low and broad. High heels are not worn for comfort in walking but to diminish the apparent length of the foot.

Personal Cleanliness.—Personal cleanliness is essential to health and comfort. Daily bathing is necessary

because it removes dirt and infectious material of external origin, and is a means of keeping the skin free from waste products which interfere with its proper function.

For persons in good health a daily cold bath is advisable. A full tub bath is best and should be taken in the morning. A shower bath or sponging with cold water is a good substitute, and may be borne by many who

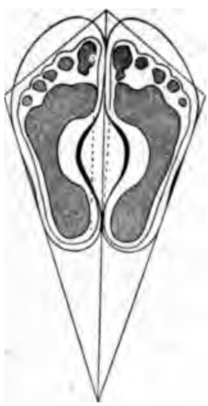

Fig. 1.—Proper soles for normal feet. (Whitman.)

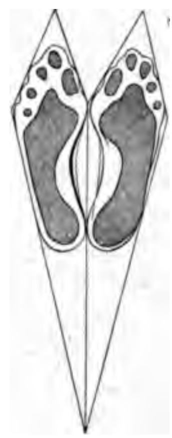

Fig. 2.—Shoemaker's feet. (Whitman.)

cannot endure the shock of immersion. The effect is essentially a stimulant, and increases the activity of all the organs. The respirations are at first gasping, then slowed and increased in depth, the pulse-rate is diminished, and the temperature slightly lowered. The nervous system and mental faculties are stimulated. Upon emerging from the bath the skin should be dried

with a coarse towel; the body should be pink and warm, rather than cold.

One of the benefits derived from cold bathing is the immunity from catching cold.

Hot bathing is a grateful means of reducing the lameness of muscles after hard work or violent exercise. It is depressing, and while of value in conditions of insomnia, should only be taken by the advice of a physician.

Persons who are not in good physical condition should avoid extremes, the best results being obtained when the water is at the temperature of the body.

For purposes of cleanliness the cold bath should be supplemented by the use of warm water, soap, and a brush, which are effectual means for removing the dirt and effete material from the surface of the body.

Care of the Hands.—Especially should careful attention be given the hands, not only to keep them immaculate, but in good condition by the use of lotions, cold cream, etc. This is particularly necessary for nurses, as most of the infections from which they suffer are due to carelessness in the care of the hands.

Exercise.—In the majority of individuals all the exercise needed is taken as an inseparable element in their regular work, and any additional amount should be performed as a recreation.

Violent exertions do harm when a person overworks the heart (gets "out of breath"); it should be regarded as a danger signal, and absolute rest should be enjoined.

Outdoor exercise when possible is the best. There are few people who have not the power to walk, and walking

is an excellent form of exercise; at the same time it furnishes a means of recreation, and is a luxury all can afford.

Sleep.—The amount of sleep required depends upon the physical effort expended; the diet, to a certain extent; and upon the age and general condition of the individual. The average adult requires about eight hours of complete repose.

CHAPTER III.

BED MAKING.

Economy of Time, Labor, and Hospital Property—Making a Bed with the Patient in—Changing Linen, Etc.—Fracture Bed—Cradles—Head-rests—Moving and Lifting Patients.

In making a bed there are three things to be considered: (1) The comfort of the patient; (2) the economy of time, labor, and utensils; (3) its beauty or symmetry.

The comfort of the patient consists in having an absolutely smooth surface on which to lie, free from humps in the mattress and wrinkles in the sheets; the blankets put on to cover the patient, not tucked under the mattress so tightly that it is impossible for the patient to turn over or draw up the feet; the pillows adjusted to suit the occupant and the existing conditions.

Pillows which may be very comfortable under some conditions may be decidedly uncomfortable at other times.

Economy of time and labor consists in gathering the necessary clean linen to make the required number of beds. Considerable time is lost by the failure to do this.

Place a chair at the foot of the bed, remove from the bed each article separately, and fold it over the chair; thus the nurse is able to get the required sheet or

blanket from either side of the bed, saving many steps and considerable time. Economy of linen means its proper adjustment. A sheet carefully and tightly put on the bed or a spread or pillow case adjusted without crushing remains fresh much longer.

That the ward may present an orderly appearance, it is often necessary to change linen which is only *badly crushed.*

To make an empty bed, remove separately each article of clothing and fold over a chair at the foot of the bed. Turn the mattress from head to foot, that the heavy part of the body may not always come in the same place. Adjust the under sheet by tucking it well under the mattress at the head of the bed, allowing about twelve inches for this; then standing at the foot, pull the sheet tightly and raising the mattress, draw it over the end; when it is lowered the sheet will be stretched on as tightly as it is possible to make it. Fold back the corners and tuck under the mattress, the ends first, the center last.

The rubber sheet is put on crosswise over the center of the bed. The draw sheet is to entirely cover the rubber with two thicknesses, or a large sheet may be folded and used. In either case the upper edge should come well up under the pillow.

The upper sheet should be put on so that the smooth side of the hem comes on the outside when turned down over the blanket. Each blanket is put separately, the sheet turned down at the top and tucked in all together, in the order of the under sheet.

It is possible to adjust the spread in so many different

ways that a description is difficult. It should be borne in mind that a spread is not for the purpose of hiding a poorly made bed, which it can never do.

Pillow cases should be carefully put on so as not to crush; the corners should be well filled out with the seams toward the head of the bed. With both hands in the center, press the pillows down so that they will lie flat.

To Make a Bed with a Patient In.—Remove all the upper clothing except one blanket, which is to remain over the patient. If not uncomfortable, the pillows may also be removed, otherwise they are moved with the patient to either side of the bed. Standing at the foot of the bed, pull the upper sheet from under the blanket. Loosen the bottom sheets and turn the patient on the side, having him lie near the edge of the mattress. If the patient needs help in turning, he should always be turned toward the nurse, then there is no possibility of his being rolled out of bed. The draw sheet, rubber, and bottom sheet are then folded close up to the patient's back; a fresh bottom sheet put on that part of the mattress which has been uncovered and the ends and outer edge tucked under the mattress, the free edge rolled, or folded close beside the soiled linen. The rubber may then be pulled back, covering the fresh sheet; then the draw sheets are put on, the outer edge being tucked in. Before going to the opposite side, turn the patient, drawing the pillows to that side. The soiled linen may then be removed and the fresh drawn through and tucked in. Care must be taken that there are no wrinkles in sheets or

rubber, and that they are so securely tucked in that they will not work loose after a few hours.

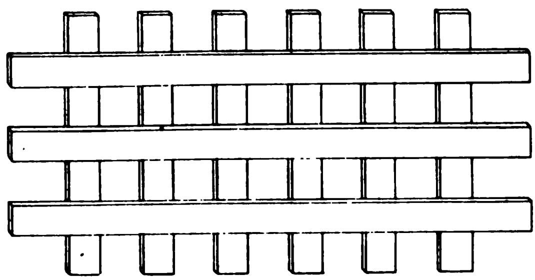

FIG. 3.—Fracture board made from one-half inch pine, painted white, size of bed.

Replace pillows and make the patient comfortable; then proceed as in an empty bed.

A fracture bed differs from a regular bed only in that a so-called fracture board is placed between mattress and springs, making a uniform unyielding surface.

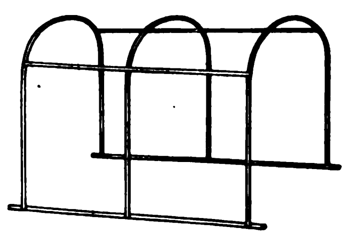

FIG. 4.—Bed cradle.

A cradle may be put over the feet to keep off the weight of the bedclothes.

Head rests are used for convalescents and patients who have difficult breathing from any cause, or for

some reason are more comfortable in a reclining position.

The head rest is not comfortable for all persons. When used, it is best adjusted under the mattress, the whole being covered with a sheet tucked in.

Three pillows are necessary: the first two placed one above the other, and the third to stand on end, should be pulled down under the back.

Fig. 5.

To Change the Position of Patient.—The necessity for changing the position of patients increases with their degree of helplessness, not only as a means of adding to their comfort but to guard against bed-sores.

To turn those who are able to be of slight assistance, the nurse should stand close to the side of the bed, with one hand under the shoulder and the other under the hip of the opposite side, and the patient is turned

toward the *nurse.* By this method it is impossible to roll a patient out of bed.

A nurse should never attempt to move an absolutely helpless patient alone. It is best done by two nurses standing at opposite sides of the bed, and by holding the sides of the sheet, lift him to any part of the bed or to a different bed if necessary.

It also requires two nurses to make the bed: one to turn the patient and prevent him from falling out, and the second to adjust the bedclothing.

CHAPTER IV.

ADMISSION OF PATIENTS.

Listing and Care of Clothing and Valuables—Bathing—Washing the Hair—Routine Care of Patients—Care of Dead.

In many hospitals patients are admitted to a receiving ward, where, when not too sick, they are undressed, bathed and their clothing and valuables listed and cared for. When no receiving-room is provided they are admitted directly to the ward.

Whatever the arrangement may be, the patient should receive immediate attention and be made as comfortable as possible, both mentally and physically.

All patients should be given a kindly, sympathetic welcome. This is usually appreciated and helps reassure them in spite of former fears and prejudice.

It is particularly true of non-English speaking people and of children.

If seriously ill, the patient should be laid on the bed before undressing. The clothing, no matter what its condition, should be removed carefully.

When there is injury to either leg or arm, the garments should be removed from the well side first. If badly scalded or burned, the clothing should be cut off.

The undressing of patients should be done by two persons, and duplicate lists made of all articles, including contents of the pockets, valuables, etc.

WOMEN'S CLOTHING LIST.

Name ....

Date .... Ward ....

N. B. The Head Nurse will make out this list immediately on the entry of every patient, and send it promptly to the Supervisor's Office. After being entered there, it will be returned and kept with the clothing. When the patient is discharged the Nurse must verify the clothing with the list, and return it to the Supervisor, with the patient, when she leaves the ward.

Bonnets ....
Hats ....
Boots ....
Shoes ....
Slippers ....
Stockings ....
Dresses ....
Skirts ....
Waists ....
Flannel Skirts ....
Drawers: Cotton .... Flannel ....
Corsets ....
Chemises ....
Nightgowns ....
Aprons ....
Towels ....
Handkerchiefs ....
Shawls ....
Cloaks ....
Gloves ....
Sacs ....
Collars ....
Cuffs ....
Neckties ....
Valises ....
Valuables ....
....
....
....

.... Head Nurse.

Entered in "Entry Book" this day.

.... 191

....

Supervisor.

Date of Discharge 191

I have carefully compared the clothing with this list and find the articles all accounted for[1]

....

Head Nurse.

[1] Except.

These lists should be signed by the head nurse and *by the patient*, who is allowed to keep one, and the other is kept with the clothes.

All clothing should be examined carefully for pediculi, and if necessary, fumigated. Articles returned after being fumigated which are soiled should be marked with the patient's name, ward, and bed number, and duplicate lists made and sent to the laundry, one list to go with the soiled articles, the other to be kept in the ward.

Valuables should be sent to the hospital safe, kept for that purpose. Money, papers, jewelry, etc., should be put in an envelope and sealed, and a list of the contents with the patient's name and ward written on the outside.

The temperature, pulse, and respiration should be taken. If the temperature is not above 99° F. and the pulse is of good quality, the patient may be taken to the bathroom for a tub bath if there is no special reason for not doing so. A person with skin disease or a rash would be excepted. Patients should not be allowed to take a bath unattended by a nurse; after the bath they should be given a bath-robe and slippers, or be put in blankets and taken to bed in a wheel chair.

When preparing to give a bath in bed, there should be at the bedside hot water, plenty of towels, wash cloth, soap, brush, nail file, scissors, orange stick, and comb, both coarse and fine. If the patient has no tooth-brush one should be provided, or swab sticks with small pieces of gauze substituted; listerine or any suitable mouth wash may be used to clean the mouth.

The bed should be protected with a rubber, covered with a blanket, the bedclothes neatly folded down to the foot of the bed, and the patient covered with a warm wool blanket (never a cotton blanket or sheet). The face and neck should be bathed first, then the rest of the body in sections, keeping all the body covered warmly except the part being bathed.

Special attention must be given to the nails, and the hairy portions of the body should be examined for pediculi. If there are pediculi the hair should be saturated with tincture of larkspur and securely pinned up in a towel before the bath is commenced. Later the hair should be combed with a fine comb and thoroughly washed. Several applications of larkspur followed by the use of a fine comb may be necessary before washing.

Ether or hot vinegar may be used to remove nits, but many applications may be required.

To wash the head of a patient in bed, the pillow should be covered with a rubber and a rubber sheet placed about the neck, with the sides folded over to form a drain, and the end dropped in a pail or slop jar at the head of the bed. Two pitchers are necessary, one containing warm, soapy water, and the other clear warm water for rinsing.

The soapy water should be poured over the hair and the scalp thoroughly scrubbed until it is clean, and then rinsed with clear, warm water. The head and hair should be dried as much as possible with towels, the tangles combed out, and the hair spread over the pillow to dry.

It is not always possible to wash the hair of a female patient when the entrance bath is given, as the procedure is tiresome for the patient who is seriously ill.

THE ROUTINE CARE OF PATIENTS.

The first duty of a nurse is to her patients. She should make every effort to make them comfortable both physically and mentally; she can do much for the mental comfort of one by showing an intelligent interest, not in "the case" alone, but in the individual.

Worry and anxiety may retard recovery, and it is as much a point in good nursing to guard against this as it is to provide for their physical comfort.

Little things which are only annoying when well, become real troubles when ill. Some of the disturbing things are unnecessary exposure during treatment, giving baths, doing dressings or giving a bed-pan.

A screen should always be provided and an effort made to give one as much privacy as possible, also care should be taken that one is not exposed to a draught.

In the care of a patient do not lean against the bed nor knock against it in passing. It is always annoying and in certain conditions may cause considerable discomfort, particularly when every move made by the patient himself is painful.

Never leave one in doubt when a request is made. If not possible to fulfill it immediately tell him so, also that you will attend to his wants as soon as possible:

usually the patient is satisfied to wait a reasonable length of time.

Never allow whispering nor the discussion of any patient's condition within hearing of the patient.

When necessary to do any treatment explain its nature as well as possible before starting. It seems less formidable and patients are likely to consider such an explanation a compliment to their intelligence (which of course can do no harm).

If possible, give a patient the things he likes to eat. See that the dishes are perfectly clean, not chipped, and are attractively arranged. Tray cloth and napkin must be immaculate. A soiled or crushed napkin or badly served food may spoil one's enjoyment of the meal or even interfere with its digestion by creating a disgust for food.

Too large portions of food, often something which has been anticipated with a great deal of pleasure, may take away the appetite of a patient entirely, or create such a dislike for the particular article that it is never again enjoyed.

Serve food intended to be eaten hot in covered dishes which have been heated. Do not put hot food on a cold dish, nor cold food (ices, etc.) on a dish which has not been chilled.

When feeding a patient do not hurry. As much care should be exercised in this as in doing any treatment, remembering that it is equally necessary. He should be put in the most comfortable position and be made to feel that this particular duty is a pleasure rather than an ordeal.

After feeding nothing gives more comfort than a thorough cleansing of the mouth. One who is able to do this for himself should be supplied with a cup of water, not too cold (which may or may not contain a small amount of listerine or potassium chlorate), a tooth brush and kidney basin, also a glass of cold water to rinse the mouth after using the toothbrush.

Patients too sick to take this care must have their mouths washed by the nurse. To do this will be required the articles enumerated above, or swabs made with cotton wound on applicator sticks. If the patient is very ill or slightly delirious, it is necessary to separate the jaws and hold them apart while the tongue is being cleansed. This is best done by using a wood tongue depressor, which is always of soft wood and eliminates the danger of breaking the teeth, which is always present when a harder material is used.

If the mouth shows ulcerations great care should be used in cleansing. A weak solution of myrrh and very soft swabs give the greatest degree of comfort.

A neglected mouth may be the source of a reinfection and always reflects *discredit upon the nursing, for it is the nurse alone who is responsible for the condition.*

The sordes, which consists of mucus, discarded epithelial cells, blood, from cracks or fissures, partially decomposed, and a multitude of bacteria is always a menace. The nurse who cares for such a mouth should thoroughly scrub and disinfect her hands following the procedure, remembering that she has come in direct contact with organisms causing the disease in the individual treated.

Change of position is necessary for the comfort, as well as an efficient measure in the prevention of abrasions and pressure sores.

One suffering from rheumatism or any other condition in which sweating is excessive should be bathed frequently and powdered, parts showing the least sign of pressure should be protected by air rings, pads or pillows. Painful joints or limbs supported by pillows and elevated when possible. Sheets changed often and kept smooth, cool and dry.

Fever patients, whose skin is hot and dry, in their restlessness often rub the skin from the elbows and knees; these parts may be protected by a soft cotton dressing held in place by a bandage; if only slight, a cocoon dressing.

In all conditions, turn the patient from side to side whenever possible, if necessary supporting him by a pillow tucked close up to his back; rub the parts subjected to pressure, especially the back, very frequently and bathe with alcohol.

The giving or removing of a bed-pan, which is such a frequent and necessary duty, may in most cases be accomplished with little trouble or discomfort to the patient. The bed-pan should be warmed, usually under hot water, then dried. In taking this to a patient it should be covered; there should also be taken to the bedside, toilet paper, warm water in a small pitcher kept for the purpose, cotton pledgets or small pieces of gauze and a kidney basin. After using, the patient should be made as clean as possible with the toilet paper, then washed by pouring the water slowly over

the parts and drying with the pledgets of cotton or gauze. The kidney basin is to collect these after using.

In removing the bed-pan assist by passing the hand under the hips and elevating the patient slightly. When one is particularly helpless two nurses, one at each side of the bed, will be necessary to do this.

THE CARE OF THE DEAD.

When dissolution has taken place the friends of the patient, if present, should be allowed to remain with their dead for a short time.

After the doctor has pronounced life extinct, the body should be prepared. If there is an open wound it should be sutured, and in any case a fresh dressing put on; the body thoroughly washed with soap and water, the hair neatly braided (if a woman). A triangular bandage, at least 1 yard square, with a pad of non-absorbent cotton, should be pinned on like a child's diaper. This will catch any discharges which may come from the rectum or vagina; the bladder should be emptied with a catheter.

The arms should be fastened across the body with a bandage, the legs should be fastened at the knees and ankles in the same manner. The eyes may be kept closed by inserting a small piece of tissue paper under the lid, the chin supported by a roller bandage or a support provided for the purpose. Packing the body cavities is no longer considered necessary; besides it is thought that it prevents the escape of gas and causes distention of the body.

False teeth which have been removed should be returned to the mouth after death; they do not often remain in place, however, and it will require the skill of an undertaker to properly adjust them.

If death occurs in a hospital, the name and age of the patient, the date and hour of death, the ward, must be plainly written on a card and attached to the patient, either fastened to the wrist or securely pinned to the shroud sheet.

CHAPTER V.

BED-SORES.

Their Cause and Treatment.

BED-SORES are so called because they occur on persons who are compelled to lie in bed.

They may be defined as lesions of the surface of the body, often becoming gangrenous.

Bed-sores, in many instances, may be prevented, while in some cases they cannot in spite of all care.

The predisposing causes are poor circulation, malnutrition, paralysis, and edema.

Undue pressure and neglect are invariably the immediate causes.

Restless patients may rub the skin off the elbows while lying in bed, which may, through neglect, result in a deep lesion. The application of an oily lotion and protection from further injury is usually all that is necessary.

Bed-sores caused by moisture appear as a red, swollen area, upon which the skin is macerated, and in places the epidermis is separated from the true skin, forming blebs.

The skin is easily broken and rubbed off, leaving a raw surface, which is liable to all kinds of infection. Patients who are incontinent, either from paralysis or

other causes, are particularly liable to develop bed-sores of this class.

The treatment consists in making the part absolutely clean by first washing with soap and water, then applying a 4 per cent. solution of boracic acid. The surface should be thoroughly dried with sterile cotton and powdered with an antiseptic powder. The main object is to keep the part thoroughly clean and dry. It is best not to cover with a dressing, but it is essential to turn the patient from side to side that no pressure may exist in that particular spot.

Deep sloughing sores are caused by poor circulation, either local or general, and pressure. The greatest number are of this class, and are the only ones unavoidable. They occur in persons who are paralyzed and cannot change their position. That sensation is lost and they do not suffer discomfort, together with the generally poor circulation, results in their rapid development. A sore may develop in a single night or a few hours. Death has sometimes been attributed to the absorption of toxins from bed-sores of this class.

They appear first as a dark red area, afterward becoming a deep purple or black, from which the skin separates. This darkened area draws away from the surrounding healthy tissues and may slough out or be cut out, leaving a deep, open, infected wound, which must heal by granulation; if, indeed, healing ever takes place.

The treatment is usually ordered in each individual case. It consists of hot, moist dressings until the slough is removed, followed by one which will promote granu-

lation, as fluffed gauze moistened with balsam of Peru, or equal parts of alcohol, glycerine, and tannin, loosely packed in.

"Pressure sores" are usually the result of the improper application of some apparatus, splint, plaster cast, or bandage.

The undue pressure is in a localized area, cutting off or impeding the circulation. A deep slough results. They are less rapid in development than those caused by *general,* poor circulation. The treatment is the same as for bed-sores.

There is nothing which tends to show poor nursing more than does a bed-sore, for they may in the majority of cases be avoided.

First, there should be absolute cleanliness; the bed dry and free from crumbs and wrinkles; all undue pressure should be removed, by changing position, and the use of air rings and pads; any friction should be removed or prevented by protecting the part.

As a routine the back should be rubbed with alcohol and dusted with talcum powder at least once a day. In many cases this is necessary every few hours. This not only toughens the skin and stimulates the circulation, but affords an opportunity to inspect the prominent parts thoroughly, particularly at the shoulder blades and at the tip of the spine. Any red spots which cannot be diffused by rubbing, or places where the skin is broken or worn off, should receive immediate treatment.

CHAPTER VI.

TEMPERATURE, PULSE AND RESPIRATION.

Heat Production and Elimination—The Normal Temperature—The Pulse: Abnormal and Normal—Respiration, Types and Characteristics—Clinical Thermometers and Charts.

BODY TEMPERATURE.

ALL warm-blooded animals have a temperature nearly constant, regardless of the climate in which they live.

This is called the "normal temperature," and is compatible with health.

It is the balance between heat production and heat elimination.

Heat is produced in the body by oxidation of the food which has, in whole or in part, become a part of the body.

The oxygen which is breathed into the lungs eventually combining with substances in the body produces combustion, the result of which is heat.

Some of the heat is utilized as energy and some given off in the expired air. About 88 per cent. of the entire amount lost is from the surface of the body by radiation and the evaporation of the moisture from the sweat glands: A small amount is lost through the excretions. The balance is retained to furnish the body heat, which with very slight variations is constant.

Increased activity results in an over-production of heat which in health is given off through the increased amount of moisture on the surface of the body and the expired air by more rapid breathing. By this means the balance is maintained, which is 98.6° F. or 37° C.[1]

Deviation from this is serious in proportion to the degree of abnormality.

Any rise in temperature of the body is caused by increased oxidation. At the same time there may be an increase in the amount of heat lost, but not in proportion to the over-production, so the balance is lost. Heat is then stored up in the body, which condition is spoken of as fever, or pyrexia.

This fever may be generated within the body, the result of waste not properly eliminated, or it may be produced by poison taken in. This is usually in the form of bacteria.

All infections to a greater or lesser degree are accompanied by fever.

Subnormal temperature or a temperature below normal is more often due to the low production of heat than to its excessive loss, as is the case of starvation, shock or collapse, and after wasting diseases. In hemorrhage, excessive vomiting, diarrhea, and exposure to

[1] To reduce Fahrenheit to Centigrade scale and *vice versa:*

Fahrenheit scale: 32° above 0 is freezing-point; 212°, boiling-point; between freezing and boiling there are 180°.

Centigrade 0 is freezing; 100°, boiling-point. Every Fahrenheit degree is $\frac{100}{180}$ or $\frac{5}{9}$ the size of a Centigrade degree.

To change Fahrenheit to Centigrade scale:

$F. - 32° \times \frac{5}{9} = C.$

Example: $212° F. - 32° = 180° \times \frac{5}{9} = 100° C.$

To change Centigrade to Fahrenheit:

$C. \div \frac{5}{9} + 32° = F.$

Example: $100° C. \div \frac{5}{9} = 100° \times \frac{9}{5} = 180° + 32° = 212° F.$

cold the low temperature is caused by the direct loss of heat.

A certain amount of heat is necessary to life; any diminution shows a low vitality. If greatly diminished, death will result.

The degree of abnormality is second in importance to its duration.

The human body can stand a greater increase than decrease in temperature. One may recover from an illness in which the temperature has ranged 3° or 4° above normal for weeks; while a temperature 3° or 4° below, results fatally in a few hours.

The degree of temperature compatible with life depends considerably upon the cause of abnormality.

Patients may recover from sunstroke after a temperature of 108° or 110°. This excessive degree lasts only a few hours.

In pneumonia, which is a disease of short duration, the temperature frequently reaches 105°, and recovery follows.

In malaria 106° is not uncommon, while such a degree prolonged, as in typhoid, would undoubtedly be fatal.

Patients have recovered from shock with a temperature of 95° and died of a prolonged temperature of 97°, as in starvation or cancer of the stomach.

THE CLASSIFICATION OF BODY TEMPERATURE.

Hyperpyrexia, 105° F. or over.
Pyrexia (fever), 101° F. to 105°.
Subfebrile, 99° F. to 101°.

Normal, 98° F. to 99°.
Subnormal, 97° F. to 95°.
Collapse, 95° F. or below.

It is customary to take the temperature at least twice daily; this should be done at the same hour every day in order that an exact record may be made.

In severe cases it is recorded every four hours or oftener. In this way any sudden rise or fall is noted which otherwise may have been overlooked. It is also necessary in carrying out antipyretic treatment.

Records are made on clinical charts by drawing lines up and down according to the degree of temperature.

The records are valuable as they afford a clinical picture of the course of the disease.

As each disease has individual characteristics and runs a certain course, an accurate record is of importance.

A clinical thermometer is the instrument used to take the temperature of the body. It differs from all others in that it does not record changes in the temperature of the atmosphere, but is self-registering.

For convenience the temperature is usually taken by the mouth. The bulb of the thermometer is placed under the tongue, the lips closed, and the patient told to breathe through the nose.

When it is impossible to do so, because of any malformation or temporary obstruction of the nasal cavities and the patient breathes through the mouth, an accurate record cannot be made. In such cases it is best to take the temperature in the axilla or rectum. (The vagina or groin may be used.)

When taken by the axilla the record is about $\frac{4}{10}^\circ$ F. lower than when taken by the mouth and $\frac{4}{10}^\circ$ F. higher by the rectum than by the mouth, when a change is made from the mouth to axillary or rectal temperature.

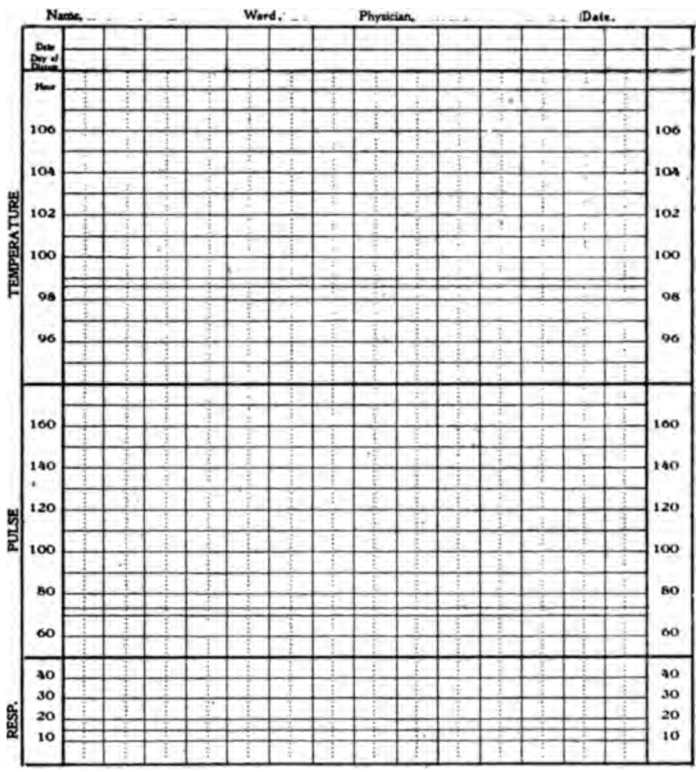

FIG. 6.—Temperature chart.

The first record should be marked A (axillary) or R (rectal), as the case may be.

The axilla should be wiped dry, care being taken that two surfaces of the skin come together, covering the bulb completely. The arm should be held to the body tightly.

When taken by the rectum it must be empty, as otherwise no record will be made.

A nurse should never leave a patient who is having the temperature taken by rectum. The thermometer may get lost in the rectum or be broken off. Either accident would be decidedly serious.

An ordinary hospital thermometer will record in three minutes by the mouth or in six by the axilla or rectum.

A young child or an unconscious, delirious or insane patient should not have a thermometer put in the mouth, because they are liable to break it between the teeth, and there is a possibility of swallowing pieces of glass or the mercury. When not in use, thermometers should stand in a jar or mug kept for that purpose, in which there is some disinfectant solution or 70 per cent. alcohol.

A layer of absorbent cotton may be put in the bottom of the jar to prevent breaking the thermometer, but should be changed each time the thermometers are used.

The mercury should always stand as low as 96° F. before taking the temperature of any patient. This is accomplished by grasping the end firmly and shaking it down.

THE PULSE.

The pulse is the expansion and recoil of the arteries caused by the contraction of the heart. By this contraction the blood from the left ventricle is forced into vessels which are already full; this causes distention, which may be felt in any of the superficial arteries, and is called a pulse wave.

This furnishes an index to the heart's action, whether it be strong or weak, rapid or slow, regular or irregular.

The normal pulse is regular both in strength of beat and rhythm; it should beat from 70 to 80 times per minute, and there should be a medium artery, neither distended greatly nor very compressible.

The pulse is slower in man than in woman. In young children (three or four years) it may be 100; in newborn babies 120 to 130. This gradually decreases until adult age, when the average pulse-rate is about 72.

In extreme old age it becomes much slower than normal, sometimes reaching 50 or 60.

The normal pulse is subject to considerable variation as to the number of beats per minute. It is greatly influenced by exercise; the more violent, the more rapid the pulse; excitement, emotion, and digestion all affect the pulse, increasing the rate somewhat.

The abnormal pulse differs from the normal in many ways. The types directly due to the heart's action are: (1) irregular pulse—may be irregular in strength of beat or in rhythm; (2) intermittent pulse—where a beat is occasionally lost; (3) frequency—slow or rapid.

While these conditions may exist in a diseased heart

they do not necessarily mean organic trouble; it may be purely functional, denoting weakness.

Any of the above abnormalities may exist after a long illness, particularly after typhoid or where there has been a considerable wasting of tissues.

Types due to the condition of the bloodvessels are:

Dicrotic pulse is caused by the relaxation of the arterial walls: Two beats are felt. A strong beat or pulse wave, followed by a weaker one, for each contraction of the heart.

The first wave is caused by the contraction of the ventricle and the secondary, or smaller wave, by the closure of the aortic valve. It may be distinguished from an irregular pulse by counting the heart-beat for the same length of time.

A high-tension pulse, or one in which the arteries seem distended and are non-compressible, is usually due to the contraction of the small vessels, arterioles, and capillaries.

A low-tension pulse, the exact opposite, may denote a weak heart, but more frequently relaxed capillaries.

Pulse may be felt at any superficial artery. For convenience the radial artery (at the wrist) is the one most often used. If the heart's action be weak it may be felt more plainly at the carotid or temporal arteries.

It is possible to make an accurate count in one-half minute, but it is not possible to determine the character of the pulse in that time; consequently, it should be held long enough to discover any abnormality if there be one. *The character of the pulse is most important.*

In counting the pulse, the first two or three fingers

should be held on the artery, never the thumb. The pulsations in one's thumb may often be felt and confused with that of the patient.

RESPIRATION.

Respiration is the function by which oxygen is absorbed into the blood and carbonic acid exhaled. The assimilation of oxygen and the evolution of carbonic acid take place in the tissues as a part of the general process of nutrition.

The respiratory movements are two, and consist of an alternate dilatation (inspiration) and contraction of the chest (expiration). Both are mechanical, muscular movements, and while involuntary they may be modified to a certain extent.

Inspiration, taking in of oxygen, is due to the contraction of the respiratory muscles, causing dilatation of the chest. The air then rushes in to fill the space thus created.

Expiration is partially a passive process, and is the result of the recoil of the walls of the thorax, and of the elastic tissues of the lungs, whereby the carbonic acid is expelled.

The respiratory movements vary according to age, sleep and exercise, being most frequent in early life.

The number is increased by exercise and decreased by sleep.

The ratio to the pulse is about 1 to 4 in health, and in the normal adult the average is about twenty respiratory movements per minute.

Normal respiration should be quiet, easy, and regular. The types vary according to age and sex.

The abdominal type is most marked in children, irrespective of sex, the movements being effected by the diaphragm and abdominal muscles.

The superior costal type in the adult female: The movements are more marked in the upper part of the chest from the first to the seventh ribs, permitting the uterus to ascend into the abdomen during pregnancy without interfering with respiration.

The inferior costal type is manifested by the adult male; the movements are largely produced by the muscles of the lower part of the chest and by the diaphragm. In disease the respiration varies according to existing conditions.

In pneumonia the respirations are rapid, difficult, painful, and shallow: Rapid and difficult because of diminished air space; painful and shallow because of the inflammatory process.

Rapid heart action also causes difficult or labored breathing, an increased amount of blood being sent to the lungs for its supply of oxygen; Nature labors to supply that demand.

Difficult or labored breathing from any cause is called dyspnea. Accompanying this is usually a dusky or blue color of the skin called cyanosis; this is due to the insufficient amount of oxygen absorbed.

An upright position with the support of bed-rests and pillows is necessary in conditions of this kind.

Stertorous breathing is that in which a snoring sound is produced.

It usually accompanies unconsciousness from any cause; it may occur during sleep; the unconsciousness produced by an anesthetic or some cerebral condition. In the latter case it is a serious symptom. The greater the degree of unconsciousness the more marked and loud will be the snoring.

The Cheyne-Stokes respiration is a type in which there is an irregularity which occurs with almost perfect rhythm.

It may occasionally occur in elderly persons, particularly when asleep. When associated with disease it is a grave symptom.

It is most likely to occur in diseases or conditions of the brain, occurs less frequently in those of the heart and kidneys, and is usually considered a premonition of the end.

In Cheyne-Stokes breathing there will be a very quiet, shallow respiration, the chest movement being almost imperceptible. Each successive breath becomes deeper, more audible, and the respiratory movements more pronounced until it results in a deep snoring respiration.

Then it decreases by the same stages until it finally stops for an interval varying from five to thirty seconds, when it is repeated.

As the respiration increases in intensity the interval between breaths usually decreases in proportion.

Edematous breathing is the result of fluid in the air passages. It is difficult and produces a loud, rattling noise as the air passes in and out. It is always accompanied by considerable cyanosis, and is a serious condition.

Usually little can be done to relieve the condition. It is often a premonition of death.

When counting respirations the action of both sides of the chest should be noted: if it be symmetrical or otherwise; also the frequency, ease, and depth of each respiration.

It is best that patients should not know that the respirations are being counted or they may involuntarily modify their breathing.

When ascertaining the quality of the pulse the respirations may be counted, and the pulse afterward. Both may be recorded at the same time.

In certain conditions when the frequent record of temperature, pulse, or respiration is necessary, an hourly chart may be kept. The variations are recorded every hour, with treatment, nourishment, and general condition of the patient.

Such charts are usually arranged for twenty-four hours only.

BEDSIDE NOTES.

Name______________________ Ward__________ Bed Number__________

Diagnosis______________________

Date of Admission______________________ Physician______________________

When ordered	General Orders	When omitted

Time	Temp.	Pulse	Resp.	Urine	Def.	Treatment	Nourishment	Remarks
Total								

CHAPTER VII.

BACTERIA AND THEIR MEANING.

Classification—Growth—Relation to Disease—Protozoa—Yeasts—Molds—Infections—Methods of Sterilization—Disinfectants—Antiseptics—Deodorants.

BACTERIA are the lowest form of plant life known. They differ from all higher forms of life in that their whole organism is made up of a single cell. They are microscopic, can only be seen with a high-power microscope, consequently they are defined as *unicellular, microscopic vegetable organisms.*

Like other plants, each possesses an individuality and presents characteristics peculiar to itself. This is shown in its size, form, and development, each cell producing its kind. They also possess the power of growing in different media and may be transplanted without injury to themselves, hence the transmission of disease.

These organisms are exceedingly small and consist (probably) of a nucleus cytoplasm and a cell wall, which may be a condensation of the superficial protoplasm; they are colorless and transparent. Unlike animal cells in which the structure may be studied (by aid of the microscope), only the nucleus and cell wall are visible in bacteria.

Bacteria multiply by cell division: each bacterial cell may grow to a certain size, then division occurs, each part growing to the maximum when it in turn divides. Some divide in one hour, others in a much shorter period. It has been estimated that if multiplication went on unchecked, the descendants from a single cell would number two hundred billion in forty-eight hours.

Important factors in the prevention of unlimited multiplication are that only a small number grow to the reproducing stage; that in their growth they produce substances which are injurious and the accumulation of such material inhibits growth and reproduction.

Other means are insufficient nourishment; lack of moisture; a temperature too high, or too low; or the invasion of other forms of bacteria which may be antagonistic.

The study of bacteria has been the work of botanists, chemists, and physicians. Through this combined effort it has become known that these minute organisms are present in, upon, or have something to do with the life of all higher plants and animals.

There are two very distinct classes:

1. **Saprophytes.**—This class is most essential to higher forms of life. They not only attack and kill other organisms, but decompose dead organic bodies, converting them into simpler compounds, or setting free elements which are utilized by higher forms of plant life, many of which furnish food and clothing for man, some become the food of herbivora, either utilized as a food for man or become the prey of the carnivora, which in their turn again fall to the uses of man.

The number of this class is unknown.

2. **Parasites.**—Parasites are those which exist upon living animals or vegetable bodies.

A parasite is capable of living and multiplying in a living animal body, often to its detriment. If capable of producing disease it is said to be *pathogenic*. There are few parasites pathogenic for man. The animal upon which a parasite lives is called its host. There are a few parasites which can live a saprophytic existence for a short time; these are called *facultative*. Others must have animal juices upon which to exist; these are called *obligate parasites*.

Other classifications are:

(*a*) *Aërobic*—those which cannot live without air (oxygen).

(*b*) *Anaërobic*—those which cannot exist in the presence of oxygen.

(*c*) *Aërogenic*—gas producing.

(*d*) *Chromogenic*—color producing.

(*e*) *Fermentative* or *Zymogenic*—producing fermentation.

(*f*) *Pathogenic*—disease producing.

(*g*) *Pyogenic*—pus producing.

There are other parasitic forms of life: the *protozoa* (which are believed to be of animal origin); some of these are capable of producing disease; among the protozoa the obligate parasite exists very extensively and cannot live at all if its normal life within the animal body be disturbed.

They are usually larger than bacteria, and differ in their method of reproduction.

In medicine bacteria are of the greater interest, because protozoa which produce disease are very few.

Common classification of bacteria is according to shape, which is very simple. They are either spherical or slightly oval *cocci;* cylindrical, long or short; rod-shaped *bacilli;* or spiral-screw shaped *spirilla.* Some are motile, some not.

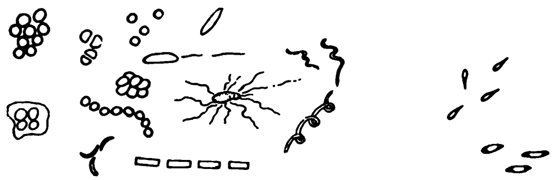

FIG. 7.—Forms of bacteria. Spores.

The power of movement is due to little appendages, which are in constant motion; they are called flagelli. Some species have them only at the ends, others are entirely surrounded by them.

The bacilli and spirilla divide at right angles to their long axis, while among the cocci division may occur only in *one* plane, resulting in the formation of chains (*streptococci*); after division the cells may remain united or separate into pairs (diplococci), or into single cells (cocci). Others divide in *two* planes, giving rise to flat sheets or irregular masses (staphylococci), or in *three* planes forming cubical masses (sarcinæ). The growth of these organisms varies according to the species. All must have food, a certain amount of moisture and heat (90°-100° F.). They grow best at the temperature of the human body.

Spore Formation.—Spores are characterized by their structural and physiologic qualities. They are spherical or oval in shape and possess a much higher resistance to heat and all sorts of poisonous substances than the cells from which they originate. Spores are most frequently found in bacilli, very rarely in cocci. (It is believed by some bacteriologists that all bacteria, under certain conditions, possess the power of sporulation.)

These spores are set free, it may be, by the degeneration of the cell itself, and under certain conditions may develop after remaining dormant for years.

The spore stage is a resting stage. It tides the species over unfavorable periods, such as dryness, famine or unsuitable temperature, until such times as favorable conditions occur for development. Of the disease-producing bacteria, only two of the spore-forming organisms, the anthrax and tetanus, are positively known to be pathogenic for man.

Closely related to bacteria and protozoa are yeasts and moulds which are a higher form of fungi of which a limited number are capable of producing disease.

Yeasts multiply by budding; a part of the cell wall protrudes, into which the protoplasm flows. When the bud reaches its proper size it separates from the original cell, and a new cell is set free.

Blastomycosis is produced by yeast. It develops in brewers; just how is not known. It is supposed that the yeast enters through slight wounds, fissures, or hair-follicles and causes abscesses which spread to different parts of the body. The development is slow, as is the process of healing.

When the lungs become involved a septic pneumonia results, which is particularly fatal. The disease is said to be due to the fermentative properties of the yeast and the destruction of tissue cells.

It is infectious and all sputum and discharges should be burned.

Moulds are not so simple in structure as yeasts; they multiply by sporulation. Ring-worms, favus and thrush are caused by moulds.

Pathogenic organisms are dangerous because of the poisons (toxins) they produce. They are always a menace because of their very general distribution and the fact that they are microscopic.

A person is infected when some organism enters the body and by its growth produces disease. This is a *general infection.* When a certain locality is involved resulting in the formation of pus, either in a wound or by abscess formation, it is a *local infection.*

The symptoms which follow are due to the activity of the organism plus the conditions which arise from the defense made by the body infected.

Methods of Destruction.—Many organisms are killed by exposure to the direct rays of the sun. It is an important factor in inhibiting the growth and multiplication of bacteria. However, it cannot be depended upon as a germicide as to kill it must shine directly upon the organism for a certain length of time.

Sterilization by use of heat either moist or dry. Moist heat is said to be most effectual.

(*a*) Boiling (100° C. or 212° F.) for five minutes. Instruments, hypodermic needles, glass, metal or rubber

catheters, rectal tubes, rubber nipples, irrigating tips, douche tips, droppers, etc., may be treated in this way.

(*b*) Live steam consists of steam being turned into an air-tight container which holds the articles to be sterilized (length of time one hour).

(*c*) Autoclave—steam under pressure means that steam is allowed to enter an air-tight chamber of an autoclave (which has a double jacket and is of great strength) and is forced in after the chamber is full; as none is allowed to escape, the incoming steam causes the pressure. The amount of pressure (expressed in pounds) means a given number of pounds to the square inch. The degree of heat is increased in proportion to the amount of pressure (15 pounds' pressure, temperature 120° C.).

Dry Heat.—Baking or the live flame. Baking in order to be effective must be brought to the temperature of 160° C. to 170° C. The live flame is used chiefly in laboratories.

Interrupted or fractional sterilization used when steam is not under pressure, the maximum temperature 100° C. is not thought sufficient to kill all bacteria, consequently must be subjected to this process several times, usually three successive days.

DISINFECTING ROOMS.

Formaldehyde gas destroys bacteria, checks their growth and acts as a deodorant.

To fumigate rooms, they should first be sealed. By a special apparatus gas is generated which is forced

through the keyhole. Formalin may be used to sterilize utensils in a solution 1 to 200.

Sulphur dioxide is one of the oldest disinfectants. It is infrequently used not only because of its disagreeable odor but it destroys carpets, rugs, and all fabrics.

Alcohol as a germicide probably holds first place; 70 per cent. alcohol is capable of killing non-spore bearing bacteria in a short time; 50 per cent. is effective as an antiseptic.

Coal-tar Products.—Body discharges, the sputum of pneumonia or tuberculosis, vomitus, urine, feces may be disinfected by carbolic acid, 5 per cent.

For linen, carbolic acid, 5 per cent., or creolin, 2 per cent; formalin, 5 per cent., may also be used.

For the skin, carbolic acid, 5 per cent.; creolin, 2 per cent., or lysol, 1 per cent., are effective.

Lysol is extensively used in gynecological and obstetrical practice in a solution of from ½ to 1 per cent.

Corrosive sublimate (mercuric chloride, bichloride of mercury) is the best known and one of the most effective of the metallic salts. It is valuable in a solution 1 to 1000 for the disinfection of hands, wood-work, porcelain, glass, etc.

It must not be used on instruments or come in contact with plumbing fixtures as it corrodes and destroys metals.

Biniodide of mercury may be used in the same strength as bichloride and for the same purposes. It must be remembered that neither of the mercury salts effective in disinfecting body discharges as they combine with albumin to form insoluble compounds.

Biniodide has the advantage of being less harmful to the skin and does not discolor the nails.

Iodine has been extensively used to disinfect the skin in preparing for operations. It is particularly valuable for this as it penetrates the skin and prevents bacteria from being carried from the surface to deeper tissues. It is used in tincture (alcoholic solution) in strength of 2 per cent. to 7 per cent.

Hydrogen dioxide solution is decomposed when it comes in contact with organic matter, pus or blood. It then yields oxygen which destroys the bacteria with which it comes in contact. At the same time it helps remove pieces of dead tissue. It is chiefly used in wounds.

Antiseptics are agents which do not kill, but prevent growth and multiplication of bacteria and prevent decomposition.

Disinfectants mentioned in a very dilute form may be used as antiseptics.

The most valuable antiseptics have not the power of disinfection.

Boracic acid is very extensively used. It is non-irritating and non-poisonous and may be used in the cavities of the body for irrigation with perfect safety.

Normal salt solution is only mildly antiseptic though it is extensively used.

Labarraque's solution 1 to 6 may be used in infected wounds; it also acts as a deodorant.

Citrate and chloride of sodium.

Citrate of sodium	2 parts
Chloride of sodium	8 parts
Water to make	100 parts

The combination of these sodium salts, while only slightly antiseptic, is extensively used in local septic conditions.

Antiseptic powders in common use are aristol, dermatol, zinc stearate, iodoform, boracic acid.

DEODORANTS.

Deodorants destroy disagreeable odors. The most commonly used are formalin, sulphonaphtol, carbolic, chlorinated soda (Labarraque's solution), potassium permanganate, chloride of lime, charcoal and many proprietary preparations too expensive to be utilized for hospital purposes.

Many of the disinfectants are deodorants. In their use, whatever agent is employed must come in *direct contact* with that which produces the disagreeable odor.

CHAPTER VIII.

VENTILATION.

Air and its Composition—Elements Necessary to Animal Life—Natural Ventilation—Methods of Supplying Fresh Air.

THE atmosphere is a mixture of colorless gases which surrounds the earth a distance of many miles.

The composition of air is not absolutely constant nor exact in atomic proportions, either by weight or volume. Ordinary air is a mixture of about four volumes nitrogen with one of oxygen; it also contains small quantities of other substances. It always contains water, carbonic acid, ammonia, with small amounts of elements from the argon group; also dust and the products of animal and vegetable decomposition.

The study of the air and its impurities has received much attention because of the fact that many diseases are due to the living particles conveyed by the air.

The capacity of the air for holding water increases as the temperature rises. The dampness of the air is not due to the actual quantity of moisture in it, but to the amount in proportion to that which the air can take up.

Air saturated with moisture has a relative humidity of 100 per cent.; if half saturated 50 per cent., etc. When the temperature falls, the moisture separates to a greater or lesser extent, and rain, dew, or fog is the

result. If the temperature falls below freezing-point, frost or snow may occur.

The respiration of animals, the process of combustion and decay are constantly changing the air by removing oxygen and producing water, ammonia, carbon dioxide and organic matter. The constant removal of oxygen is partially counterbalanced by the action of plants, which, under the influence of light, decompose carbon dioxide, retaining the carbon and setting the oxygen free.

The normal condition of breathing is that the oxygen of the air breathed should be about one-fifth the atmospheric pressure, but it has been found that life may be carried on by a gradual diminution of the oxygen to less than one-tenth. This is reached at an altitude of 15,000 feet. Any pressure less than this causes change in the relation of gases in the blood. Animals subjected suddenly to a marked decrease (below 7 per cent.) are thrown into convulsions.

On the other hand, oxygen may be increased to a considerable extent without marked effect, even to the extent of 10 atmospheres. When the oxygen pressure was increased to twice that amount (20 atmospheres), animals experimented upon by Paul Bert died of severe tetanic convulsions.

Carbon dioxide while an important constituent of the air exists in relatively very small amounts, about 0.03 of 1 per cent. This occurs in greatest abundance near the soil and is the result of oxidation of organic matter from fermentation and from the chemical action in the soil.

It has been determined that any marked variation of the percentage of carbon dioxide would so alter the atmospheric condition that it might cause the death of all living things. The carbon dioxide in the air is the source from which all green plants obtain their carbon, and this indirectly is the source of carbon in animals.

The variations of carbon dioxide in the open are too small to be of importance. It is only when stagnant air of a room is polluted by respiration and combustion that the degree of CO_2 has any sanitary importance.

Ammonia occurs chiefly from the decomposition of organic matter. It is a constant constituent of the atmosphere in slight traces but varies in amount.

Argon, which constitutes from 0.75 to 1 per cent. of the atmosphere, has not been demonstrated in the body, and probably has no hygienic significance.

Ozone, when found, exists as a mere trace. It is usually absent in large towns and cities, never present in crowded localities. It is most abundant at sea, or near the woods. It is formed in nature by electrical discharges, and by the friction of large masses of sea-water against the air. As it only occurs in about 1 to 1,000,000 part per volume of the air it, too, has no hygienic value.

Dust always floating in the air contains both living and dead substances which vary according to localities. The bacteria in the air are usually attached to particles of dust. Dangerous species of bacteria in the air come directly or indirectly from man or from some of the lower animals.

Oxygen is the element essential to all animal life. That considerable variations of pressure occur without producing ill-effects is probably due to the fact that the gases in the blood are mostly in a state of chemical combination, not in simple solution.

The amount of oxygen absorbed depends rather upon the needs of the body than the amount in the air. The excess or diminution of oxygen, unless the modification is extreme, has no effect upon respiration.

More oxygen is not taken up because more is supplied to the lungs, nor are the processes of oxidation affected unless influenced by some other condition.

Nitrogen forms about four-fifths of the air breathed; it is inert and acts as a diluent. It may be replaced by hydrogen, if the oxygen is in usual proportions, without ill effect.

The normal adult person breathes about 34 pounds of air in twenty-four hours, or the amount which corresponds to about 7 pounds of oxygen. As only about a fourth breathed is absorbed, the daily amount utilized by the adult human body is less than 2 pounds.

Moving air is necessary for the maintenance of health; it is also the chief requisite of good ventilation.

In nature the air is kept in almost constant motion as a result of differences in temperature, the hot air rising while the colder flows along at a lower level.

If the air of a poorly ventilated room can be kept in motion, many of the ill effects of a vitiated atmosphere may be avoided.

VENTILATION.

Ventilation consists in keeping an enclosed place supplied with proper air for breathing or in adapting indoor conditions to indoor life.

Ventilation must serve a number of purposes: (1) it must bring pure air in from without to dilute and remove impurities, the result of respiration and other sources of vitiation; (2) it must aid in maintaining proper temperature and degree of humidity and keep the air of the room in constant motion; (3) it must remove dust, odors and any substances which contaminate the air of inclosed places, also it must remove the impurities produced by the burning of coal, gas, or lamps.

All systems of artificial ventilation depend upon one or more of three methods of obtaining fresh air: The plenum, a method by which fresh air is forced into the room: the vacuum, by which air is extracted, or a combination of the two. The efficiency of any system depends upon the results obtained at the breathing zone.

There must be an inlet or inlets for fresh air; an outlet or outlets for foul air and a motive force to produce a current.

In what is known as natural ventilation the forces are made use of which are supplied by (1) the wind; (2) the elevation of temperature of the air of the room; (3) the draught of fires used for heating.

Where a bright fire is burning in an open grate, usually no other outlet for foul air is needed.

Proper inlets must, of course, be provided. The air

should not enter horizontally nor through gratings near the floor, but through vertical openings high up to carry the stream of fresh air to the upper part of the room, where it may become warmed before its presence is felt. The first care is to avoid cold draughts. It is better to admit air to a large room through several small openings rather than one large one. This rule holds in regard to outlets, which should be of about the same size as the inlets.

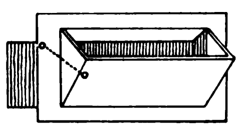

FIG. 8.—The Sheringham air inlet.

Whenever possible open windows are the best and simplest means of ventilating a room.

A Sheringham air inlet may be placed at the top of a window and when opened forms a wedge-shaped projection into the room and admits the air upward through the open top. There are many simple devices which may be used at the top or bottom of windows to admit fresh air or the exit of vitiated air. The simplest method is to open one sash of the window and fill up the space with a board; the air enters a zigzag course between the sashes. This is often used where no attempt at mechanical ventilation has been made.

Fresh air may be admitted through adjoining rooms or halls.

The degree of temperature does not affect the purity of the air in a room; but *it does affect the comfort and well-*

being of individuals occupying that room. It has been demonstrated that no ill effects result from a highly vitiated atmosphere while temperature and moisture remain low. Increase temperature and humidity and depression, dizziness or nausea result.

The degree of temperature most comfortable for the sick is between 65° and 70° F. In hospitals this degree is usually maintained during the cold months. If a lower degree is necessary for any particular individual, that individual is put near an open window or in an open-air ward.

The air should be kept pure and fresh by removing anything which may contaminate or cause an odor. Particularly should patients be kept immaculately clean, with fresh bed and body linen; all soiled linen should be immediately removed, as should excretions, vomitus and soiled dressings, which are best disposed of by dropping into a paper bag or some covered receptacle and being immediately taken away.

Sunlight is essential, and is second only to the need of fresh air. It is a well-known fact that both animal and plant life are retarded by the exclusion of sunlight. It is not only necessary to purify the air, but there are certain forms of bacteria which are killed by its direct rays.

The cheerfulness of a room not only has effect upon the spirits of a sick person, but a sufficient amount of sunlight is of utmost importance in the treatment of disease.

Since it is known that living bacteria exist in dust, it is obvious that the dust must be removed without

being disseminated. This is best accomplished by using a damp duster, which may be made of cheese-cloth and washed out whenever it becomes the least bit soiled.

For this reason a basin of warm water and soap should be used when dusting. Every article of furniture and wood work of the room or ward should receive attention. No disinfectant need be added to the water used for dusting, as the idea is to *gather up the dust,* not to make a pretence at disinfection, which to be effectual must be carried out under an entirely different régime.

Floors should be swept with a soft hair broom and dusted with a "dustless mop" (one that has been treated in such a way that it gathers rather than scatters the dust).

Brooms should be washed in soap and water and dried (in the sun if possible) at least twice such week.

CHAPTER IX.

MEDICINES.

Routes of Administration——Apothecaries' Weights and Measures —Abbreviations—Relation of Drops to Minims—The Metric System —Methods of Computing Doses.—Methods of Converting Apothecaries' to Metric.

MEDICINES are agents used in the treatment of disease. They are derived from the animal, vegetable, and mineral kingdoms, and may be solid, liquid, or gaseous.

Many insoluble substances which were once used in the form of powders, because of their disagreeable taste, are now given in tablets, pills, and capsules.

The most commonly used liquid preparations are the aqueous and the alcoholic. Of the aqueous solutions, waters, mixtures, emulsions, and syrups, and of the alcoholic, tinctures and fluidextracts are in general use. Wines, spirits, and elixirs are less frequently used.

Solutions enter into the circulation more quickly than any other preparation, hence their very common use.

The different routes by which drugs may be administered are the:

1. Digestive tract, by the mouth, by the rectum.
2. Cellular tissues.
3. The respiratory tract.
4. By the skin.
5. Intravenously.

1. **By the Digestive Tract.**—Medicines are commonly given by mouth. Solutions taken in this manner are rapidly absorbed. Fats, albuminous substances, gelatin, etc., must first be digested before they can enter the circulation.

In case of excessive vomiting, gastric disturbances, hemorrhage of the stomach, or unconsciousness, it may be necessary to give both medicine and food by the rectum in the form of an enema or suppository.

2. **The Cellular Tissues.**—This method is used in emergencies where it is necessary to get the quick action of the drug in unconsciousness and when to give by mouth is contra-indicated.

There are two ways of giving medicinal substances by the cellular tissue:

(*a*) The *hypodermic* method, which is the injection of medicines in the subcutaneous tissue with a hypodermic syringe. They are *always* given in small quantities.

(*b*) *Hypodermoclysis*, which is the injection of large quantities of fluid deep into the cellular tissue. This is usually normal salt solution, and is given to replace fluids lost. The amount varies from 1 to 2 quarts.

3. **The Respiratory Tract.**—By this method absorption is very swift, because of the extensive blood supply. It is more rapid though less practical than the hypodermic method.

Substances administered by this method must be gaseous, as oxygen; very volatile, as amyl nitrite, ether, or chloroform; or vaporized, as the inhalation of steam or atomized fluids.

4. **By the Skin.**—Inunctions, or oily substances rubbed into the skin may be used for local or general effect.

5. **Intravenously.**—Consists of injecting substances into the veins.

Used in Extreme Cases.—Usually the fluid is salt solution. It may be blood transfused directly from one person into the vein of another.

The nurse must possess a very definite knowledge of the action of drugs in order to be able to detect unexpected results. An individual may have an intolerance for a certain drug in which a small dose may produce symptoms of poisoning. Or one may have an idiosyncrasy in which an ordinary dose produces no effect, or an unusual or opposite. One should know the dose (its maximum and minimum), be able to detect the earliest signs of over-dosing, also the treatment for common poisons. One should be exact in computation of doses and accurate in measurement; should possess a knowledge of the best method of giving each individual drug and the time its administration is expected to give the best result.

For example, irritants and mineral tonics should be given on a full stomach (after meals). Vegetable tonics (bitters) before meals. Drugs expected to act upon the stomach (locally) when the organ is empty, etc.

In measuring medicines extreme carefulness is necessary. As many poisons are used, a drop more than the exact amount is always dangerous.

There are several rules which should be observed, not alone for the safety of the patient but for the protection of the nurse.

1. Read the order, being positive not only of the drug but the preparation of the drug.
2. Read the label on the bottle and the strength of the preparation, then compare the two.
3. Hold the bottle in the right hand, the label up, so that it may not become defaced. Hold the graduate on a level with the eyes. If held below, one gets more than the required amount; if held above, less than the amount.

Measure accurately, *again read the label,* wipe the bottle and *return it to the shelf.*

In giving powerful poisons, particularly the alkaloids, it is best to have a second nurse watch the measuring, as two persons seldom make the same mistake at the same time. Where mistakes occur, as they undoubtedly do, it is almost always the result of carelessness rather than ignorance. Such mistakes should be reported without delay.

APOTHECARIES' OR TROY WEIGHT.

60 grains (gr.)	=	1 dram (ʒ)
8 drams (ʒ)	=	1 ounce (℥)
12 ounces (℥)	=	1 pound (lb.)

(LIQUID) APOTHECARIES' MEASURE.

60 minims (♏)	=	1 fluidram (fʒ)
8 fluidrams (fʒ)	=	1 fluidounce (f℥)
16 fluidounces (f℥)	=	1 pint (O)
8 pints (O)	=	1 gallon (C)

Relation of Drops to Minims.

Acid acetic	10 minims	=	18 drops
Acid acetic dilute . . .	10 minims	=	10 drops
Acid hydrochloric dilute .	10 minims	=	10 drops
Acid hydrocyanic dilute .	10 minims	=	10 drops
Acid nitric	10 minims	=	17 drops
Acid nitric dilute . . .	10 minims	=	10 drops
Acid sulphuric	10 minims	=	24 drops
Acid sulphuric dilute . .	10 minims	=	10 drops
Alcohol	10 minims	=	24 drops
Amyl nitrite	10 minims	=	30 drops
Chloroform	10 minims	=	40 drops
Fluidextract aconite . .	10 minims	=	25 drops
Fluidextract belladonna .	10 minims	=	25 drops
Fluidextract digitalis . .	10 minims	=	20 drops
Fluidextract ergot . .	10 minims	=	20 drops
Fluidextract nux vomica .	10 minims	=	25 drops
Oil cinnamon	10 minims	=	20 drops
Oil gaultheria	10 minims	=	20 drops
Oil peppermint . . .	10 minims	=	20 drops
Oil croton	10 minims	=	15 drops
Paraldehyde	10 minims	=	25 drops
Solution atropine . . .	not safe to trust to drops		
Solution cocaine, 1 per cent.	not safe to trust to drops		
Solution strychnine . .	not safe to trust to drops		
Spirits nitrous ether . .	10 minims	=	25 drops
Spirits ammonia aromat. .	10 minims	=	25 drops
Spirits glonoin, 7 per cent.	10 minims	=	25 drops
Tincture belladonna . .	10 minims	=	25 drops

Tincture ferri chloride (chloride of iron)	10 minims	=	25 drops
Tincture nux vomica	10 minims	=	25 drops
Tincture opium	10 minims	=	20 drops
Tinc. opium camphorated	10 minims	=	20 drops

It will be seen that the size of the drop varies according to the density of the fluid. A minim is always the same.

The weight of fluids varies from
39 grains of ether to ʒj
765 grains of mercury to ʒj

Abbreviations.

āā (partis equales), equal parts.
A. C. (ante-cibos), before meals.
Ad. lib. (ad libitum), when desired.
Alt. hor. (altera hora), every alternate hour.
Aq. (aqua), water.
Aq. dest. (aquæ destillata), distilled water.
B. i. d. or B. d. (bis in die), twice daily.
C. (congius), gallon.
c. (cum), with.
c.c., cubic centimeter.
Dil. (dilutus), dilute.
F. (fait), make.
Fl. or Fld. (fluidus), fluid.
Gm., gram.
Gr. (granum), grain or grains.
Gtt. (gutta), drop or drops.

Inf. (infusum), infusion.
Lb. (libra), pound.
Lot. (lotio), lotion.
Liq. (liquor), liquid.
M., minim.
Mist. or Mixt. (mistura), mixture.
N. (nocte), at night.
O. (octarius), pint.
Ol. (oleum), oil.
Ol. ricin. (oleum ricini), castor oil.
Ol. tiglii (oleum tiglii), croton oil.
P. C. (post-cibos), after meals.
P. r. n. (pro re nata), when required.
or as often as necessary.
Pulv. (pulvis), powder.
Q. i. d. (quatour in die), four times daily.
℞ (recipe), take.
S. or sig. (siqua), give following directions.
S. O. S. (si opus sit), when necessary
(only to be given once).
Sp. gr., specific gravity.
ss. (semis), half.
Stat. (statim), immediately.
S. V. G. (spiritus vini gallici), brandy.
S. V. R. (spiritus vini rectificatus), alcohol.
S. F. (spiritus frumenti), whisky.
Sol. (solutio), solution.
Syr. (syrupus), syrup.
T. i. d. (ter in die), three times daily.
Tr. or Tinct. (tinctura), tincture.
Ung. (unguentum), ointment.

THE FRENCH OR METRIC SYSTEM OF WEIGHTS AND MEASURES.

The metric system is a decimal system, the unit of which is the meter. It is the system of measurement of science, and has been in use in European countries since 1801. It is legalized in the United States, but is not compulsory.

As early as the seventeenth century the idea of adopting a scientific measurement had been suggested.

In 1790 a committee was chosen to decide the length of the meter, which was to be the unit of length.

It was not until 1799 that a report was made, when it was decided that the meter was to equal one ten-millionth the distance from the equator to the North Pole (or 39.37 inches).

A bar of platinum is now preserved in Paris showing the exact length, so that the unit may always be the same.

The unit of volume and weight is based upon the length of the meter.

Any term less than the unit is expressed by the Latin prefixes *deci, centi, milli.* Greek prefixes *dika, hecto, kilo* express the terms greater than the unit.

The unit of volume or capacity, which is the liter, is a cube the side of which is $\frac{1}{10}$ of a meter, or a decimeter.

For liquid and dry measure the unit is the same.

TABLE.

10 milliters (ml)	=	1 centiliter (cl)
10 centiliters (cl)	=	1 deciliter (dl)
10 deciliters (dl)	=	1 liter (l)
10 liters (l)	=	1 dekaliter (Dl)
10 dekaliters (Dl)	=	1 hectoliter (Hl)
10 hectoliters (Hl)	=	1 kiloliter (Kl)

The unit of weight is the gram, and is equal to that of 1 cubic centimeter of water at its greatest density, 4° C.

10 milligrams (mg)	=	1 centigram (cg)
10 centigrams (cg)	=	1 decigram (dg)
10 decigrams (dg)	=	1 gram (gm)
10 grams (gm)	=	1 dekagram (Dg)
10 dekagrams (Dg)	=	1 hectogram (Hg)
10 hectograms (Hg)	=	1 kilogram (Kg)

Instead of the liter 1000 cubic centimeters is generally used.

The cubic centimeter, the gram and the milligram are the terms most often used.

APOTHECARIES' MEASURE AND METRIC EQUIVALENTS.

1 gram	=	15.432 grains
1 cubic centimeter	=	16.23 minims
1 liter (1000 c.c.)	=	33.81 fluidounces
1 grain	=	.065 gram
1 ounce	=	31.103 grams
1 fluidram	=	3.7 cubic centimeters
1 fluidounce	=	29.57 cubic centimeters

APPROXIMATE EQUIVALENTS.

1 cubic centimeter	=	15 minims
4 cubic centimeters	=	1 fluidram
30 cubic centimeters	=	1 fluidounce
1 liter (1000 c.c.)	=	1 quart
1 gram	=	15.5 grains

METHOD OF CALCULATING THE DOSE FROM STOCK TABLETS AND SOLUTIONS.

To give a fractional dose from tablets of different strength: Divide the required dose by the strength of the stock tablet.

Ex. 1. To give 1/25 gr. from tablets 1/30 gr.? $1/25 \div 1/30 = 1/25 \times 30/1 = 30/25$ or $1\frac{1}{5}$ or $\frac{1/30 \text{ stock}}{1/25 \text{ dose}} = 30/25$ or $1\frac{1}{5}$ tablets. Ans.

The second tablet should be dissolved in a number of drops or minims divisible by the number representing the denominator of the fraction. Thus one may be dissolved in 15 drops and 3 used, or in 25 minims and 5 used. This should be added to the first tablet.

Ex. 2. 1/30 gr. from 1/25 gr. tablets ? $1/30 \div 1/25 = 1/30 \times 25/1 = 25/30 = 5/6$ tablet. Ans.

Dissolve one tablet in 12 minims, use 5/6 of that amount = 10 m.

The fraction of a grain in 1 minim of stock solution is determined by the ratio or percentage of the solution.

Thus, 1 to 40, 1 m. = 1/40 gr.; 1 per cent., 1 m. = 1/100 gr.; 5 per cent., 1 m. = 5/100; 10 m. to 1/50 gr. 1 m. = 1/500 gr.

To compute fractional grain doses from a stock solution:

Divide the fraction represented by the required dose by the fraction representing the amount of drug in one minim.

Example: In a 1 per cent. solution there is 1/100 grain in 1 minim; in 1 to 40; 1/40 gr. in 5 per cent., 5/100 grain, etc.

Ex. 1. To give 1/150 grain from a 1 per cent. solution: $1/150 \div 1/100 = 1/150 \times 100/1 = \frac{2}{3}$ minim.

To 1 minim add enough water to make 3 m. and use 2 of the dilute solution.

Ex. 2. Give 1/6 grain from 4 per cent. solution, $1/6 \div 4/100 = 1/6 \times 100/4 = 25/6$ or $4\frac{1}{6}$ minims. The fraction is obtained by adding to 1 minim of the solution water to make 6 m. and using 1, which should be added to the 4 m. of the stronger solution.

Ex. 3. Give 1/150 from a solution 10 m. = 1/60 gr. In this solution 1 m. = 1/600 grain, $1/150 \div 1/600 = 1/150 \times 600/1 = 4$ m.

TO REDUCE APOTHECARIES' QUANTITIES TO METRIC EQUIVALENTS.

1st Rule—Reduce quantity to ounces and multiply by 31.1 (the number of grams in an ounce).

Ex. 1 pt. 6 oz. = 22 ounces × 31.1 = 684.2 gm.

1 pt. = 16 oz. + 6 oz. = 22 oz.

22 × 31.1 = 684.2 gm.

```
31.1
  22
 22
66
684.2  Ans.
```

Most convenient for large quantities.

2d Rule—Reduce quantity to grains and divide by 15.43 (number of grains in a gram).

6 dr. 48 grains = 408 grains ÷ 15.43 = 26.44 gm.

```
 60                 26.44 gm.   Ans.
360        15.43)408.0
 48              308.6
408 gr.           994.0
                  925.8
                   682.0
                   617.2
                    648.0
                    617.2
```

To reduce fractional grains to metric—multiply fraction by .065 (number of milligrams in a grain) and reduce to decimal by dividing the numerator by the denominator.

Reduce 1/75 grain to metric.

$$1/75 \times .065 = \frac{.065}{.075}$$

.065 reduced to decimal.

```
.075)065.0(0008   Ans.
         600
         ---
          50
```

TO REDUCE METRIC QUANTITIES TO APOTHECARIES' EQUIVALENTS.

Multiply metric quantity by 15.43 (the number of grains in a gram). The answer is in grains, which should be reduced to proper terms.

2.5 grams reduced to apothecaries' equals.

Ex. (1) $2.5 \times 15.43 = 38.5$ grains. Ans.

```
 15.43
   2.5
 -----
  7715
 3086
 -----
38.575 Ans.
```

For large quantities:

Divide metric quantity by 31.1 (number of grams in one ounce), answer will be in ounces and fractional parts.

Ex. 684.2 grams to apothecaries.

```
31.1)684.2(22 oz. or 1 pt. 6 oz.   Ans.
     622
      622
      622
```

To reduce small metric quantities to apothecaries' equivalent: Divide metric quantity by .065 (the number of milligrams in a grain), answer in grains or fraction.

Ex. (1) 2.75 grams to apothecaries'.

.065)2.75(4.23. Ans.
260
150
130
20.0
19.5

Ex. (2) .013 grams to apothecaries'.

$$.013 \div .065 = \frac{13}{65} \text{ or } \tfrac{1}{5} \text{ gr.} \quad \text{Ans.}$$

or

$$\frac{.013}{.065} = \tfrac{1}{5}. \quad \text{Ans.}$$

Write given quantity as numerator and .065 as denominator and reduce to lowest terms.

HYPODERMIC OR SUBCUTANEOUS TREATMENT.

Drugs for hypodermic use should be non-irritating, if possible; for this reason specially prepared tablets which may be dissolved in a small amount of water are in general use.

Alcoholic and ethereal preparations are always irritating and should be given deeply into the tissues.

Camphor, which is also irritating and extensively used, is prepared in oil to render it as bland as possible.

When giving a hypodermic an area should be chosen remote from bony prominences, nerve trunks and large vessels.

The danger of injecting a powerful drug into a vessel is that it may go to a center in a concentrated form and alarming symptoms or death may result.

A hypodermic tray should contain an alcohol lamp; a jar (covered) containing alcohol and sponges for preparing the part; a spoon in which the needle may be boiled; a hypodermic syringe in a medicine glass with alcohol, unless a solid metal or glass syringe, which may be boiled; a bottle of distilled water.

Having boiled the needle in the spoon, and making both sterile, the needle should be dropped into alcohol to cool.

Wipe off the mouth of the bottle containing the drug and that which contains the distilled water with a sponge dipped in alcohol; drop a tablet directly into the spoon from the bottle, without touching it with the fingers; add enough distilled water to dissolve; fill the syringe with the solution thus made; screw on the needle securely and expel the air by holding the syringe in a vertical position and bring a tiny droplet to the point of the needle.

Hold the tissues loosely away from the bone, quickly insert the needle straight into the tissues, withdraw slightly and expel the fluid slowly.

Hypodermic needles when not in use should have

wires through them; also, they should be dried by holding them over the flame before being put away.

Orders for medicines or treatment of hospital patients should always be written by the person ordering, or at least signed by him.

Only in case of emergency, *when the doctor is present,* should a verbal order be recognized, and *never* if received over the telephone.

When necessary to keep an accurate record of treatment, the twenty-four-hour chart may be used. (See Bedside Notes, Chapter IV.)

CHAPTER X.

ENEMATA.

Kinds—Frequency and Method of Giving—Utensils Used and Their Care—Douches.

An enema is the injection of fluid into the rectum, classified according to the nature of the fluid or the work it is expected to do.

1. **The simple enema** is used to empty the lower intestine and rectum; it is laxative in effect, and consists of soap and water at body temperature.

The amount varies according to the size of the patient and existing conditions. For a baby, ½ to 1 ounce; for an adult, 1 pint to 2 quarts; 1 quart is most frequently given.

To the simple enema, glycerin may be added in the proportion of 1 ounce to 1 pint of suds.

2. **The stimulating enema,** so called because it stimulates peristalsis, is given in obstinate cases of constipation and to relieve flatulence. It should be given high and may consist of:

Spirits of turpentine,		
Olive oil or glycerin,		
Magnesium sulphate,	āā	℥ij
Warm water,	ad q. s.	Oj

Spirits of peppermint may be substituted for the turpentine if there be considerable distention.

3. **Oil enema** consists of olive oil or cottonseed oil, from 4 to 6 ounces; it is given at body temperature, and is to be retained from three to four hours, when it is followed by a simple enema, to be expelled. It is used after operations on the rectum or the repair of a lacerated sphincter muscle.

4. **Milk and molasses enema** consists of equal parts of each, should be at body temperature and given high. It is thought the distention caused by gases formed produces the movement.

5. **Shock enema** consists of stimulants given in case of shock or when general stimulation is indicated. Salt solution, or salt solution and black coffee, usually make up the bulk of the enema. Brandy, strychnine, and digitalis may be added if necessary. The amount should not exceed one pint, and should be heated to 110° to 112° F. Heat is an important factor in treating the condition of shock.

Salt solution may be given by the drop method and continued for an indefinite period, from thirty-six to forty-eight hours in extreme cases.

An irrigating bag should be about half full of salt solution, which should be hot. It may be kept so by hanging a hot-water bag on ecah side of it, the whole to be covered with thick flannel.

A catheter should be used instead of a rectal tube. The number of drops may be regulated (usually 30 or 40 per minute) by using a clip on the tubing.

6. **Nutritive enema** should consist of easily assimilated liquid food. In amount it should not exceed 8 ounces for an adult, and should be given at body temperature every six to eight hours. It is necessary that the rectum be thoroughly cleansed before introducing a nutrient. For this reason a cleansing enema should be given at least once during the twenty-four hours, preferably in the morning, the nutrient to be given one or two hours afterward.

When absorption is very poor 3 or 4 ounces of normal salt solution may be given about one-half hour before each nutrient.

Nutrient enema may consist of

No. 1.

Glucose,		ℨ ij
Water,		
Peptonized milk,	āā	℥ iij

No. 2.

Egg,	1
Peptonized milk,	℥ vj
Beef juice,	℥ j
Salt,	gr. xv.

Brandy may also be added if stimulation is desired. 10 to 20 minims of tincture of opium may be used to allay irritation.

A patient may be helped to retain the fluid by placing a small pad over the anus and applying tightly a T-bandage.

Eggs, or the whites of eggs, are often used. It is a question as to whether or not any appreciable amount is absorbed.

Possibly glucose, milk-sugar, liquid peptones, peptonized milk, and salt solution are of most value.

7. **Emollient.**—Is used in diarrhea to allay irritation of the mucous membrane. Boiled starch, of the consistency of heavy cream, may be given at body temperature. 10 minims of tincture of opium to 1 pint of the starch are sometimes used.

8. **To allay thirst,** salt solution or warm water may be given.

RECTAL IRRIGATIONS.

Rectal irrigations are given in cases of colonitis and acute or chronic diarrhea. They consist of large quantities of salt solution or water at body temperature. Boracic acid, 2 per cent. solution, is less frequently given.

A solution of alum or silver nitrate may be used for its astringent effects.

A glass irrigator or fountain syringe may be used. A special rectal irrigating tube or two catheters, fastened together at the eye (one to serve for the inward flow and the other for drainage) and a douche pan are necessary. The irrigator should hang only high enough to allow the fluid to flow through slowly and without force.

Preparation and Method of Giving an Enema.—In all cases the bed should be protected with a rubber and draw sheet, and the patient comfortably covered with a blanket.

A tray at the bedside should contain a pitcher holding the fluid to be used; a rectal tube, the funnel, and an oil cup in a dressing basin; a kidney basin to receive the tube after using, and a bed-pan.

When possible the patient should be placed on the left side with the knees drawn up. The tube should be lubricated, filled with the fluid, so that no air may be injected, and inserted slowly, the tube not being allowed to become empty until the enema is given.

If necessary to keep the patient on the back while giving the enema, the hips or the foot of the bed may be elevated.

After using the utensils, they should be rinsed in cold water, then washed in hot water and soap, and the rectal tube boiled. It may then be dried and put away, or kept in a covered jar of dilute alcohol.

DOUCHES.

A douche is a stream of water or other fluid directed against some part of the body. It is used for purposes of cleanliness in washing out cavities; for its stimulating effect; to relieve inflammation; also in case of hemorrhage.

The vaginal, the rectal (described under enemata), and the aural douche are the most frequently given.

The vaginal douche, when used for cleanliness, consists of 2 to 3 quarts of mild antiseptic solution at body temperature (boracic acid 2 per cent., bichloride of mercury 1 to 10,000, or potassium permanganate 1 to 15,000 may be used).

To relieve inflammation it must be given hot, 110° to 118° F., and should consist of 4 to 5 quarts, usually of sterile water or boracic acid solution. It must be remembered that this is the only way heat can be applied directly to the parts, hence the treatment must be prolonged and the utmost care observed in making the solution the required temperature.

To guard against infection or secondary infection absolute cleanliness should be observed. The irrigator tubing and douche point should be sterilized each time before using. Patient to be immaculate.

She should lie on the back, the hips slightly elevated and the legs flexed. The irrigator should be only high enough to allow the fluid to run gently, and should be flowing through the tube when inserted.

Frequently 110° F. is as hot as can be borne at first; the heat may be increased gradually. In all cases the thermometer should be used to test the temperature of the solution.

When the patient complains that the return flow over the external parts is uncomfortably warm, vaselin may be applied before the douche is given, which will somewhat lessen the discomfort.

Intra-uterine Douche.—This treatment concerns a nurse only in the preparation, as it is seldom one is required to give it, except in extreme emergency.

In addition to the instruments used for vaginal douche there must be a bi-valve speculum and intra-uterine douche tube.

Long dressing forceps, applicators, small gauze sponges or soft cotton pledgets may be used.

CHAPTER XI.

EXTERNAL APPLICATIONS.

Applications of Heat and Cold—Counter-irritants—Cupping.

APPLICATION OF HEAT.

APPLICATIONS of heat are made so as to give added warmth to the body, relieve pain and bring more blood to the part.

When additional heat is desired, hot-water bag, frequently jugs, or cans may be used. These should be encased in a flannel cover and placed outside at least one blanket. The bags of rubber are the more comfortable, though they require filling much more often, and should be only about two-thirds full. The water which should be poured into them from a pitcher should never exceed a temperature of 125° F. The air in the bag should be expelled by laying the bag flat so as to allow the water to come up to the mouth, then the stopper should be screwed in.

To relieve pain moist heat in the form of fomentations or poultices is effective.

The apparatus for fomentation consists of a piece of coarse flannel (two thicknesses of old blanket) wrung out of boiling water. To do this, a wringer is necessary. A wringer may be made of heavy crash with a wide

hem at each end, through which sticks are inserted. The wringing is done by twisting the sticks in opposite directions.

To make a fomentation, the flannel is placed in the wringer and dipped into a basin of boiling water and wrung out. The sticks are then pulled out and the wringer, with the flannel inside, is put between *heated* basins and carried to the bedside.

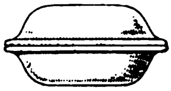

FIG. 9.—Heated basins in which the fomentation is carried to the bedside.

The surface of the skin should be oiled and the hot flannel applied, covered with wax paper, and a second flannel or a layer of sheet wadding, which must be held in place by a swathe or many-tail bandage.

Fomentations should be changed as often as is necessary to keep them hot.

Applications to the eyes should be made of circular pieces of flannel, about two inches in diameter.

It is necessary to have near the bed an alcohol lamp, tripod, and basin of water, which is kept at the required temperature, 120° to 125° F. Into this the pieces are dipped, wrung out, and put on the eye. They should be changed as often as they become the least cool, which may be every two minutes, or oftener, for they are exposed to the air and cool rapidly. They are used to relieve pain, swelling, and inflammation, consequently they should *be kept hot.*

In case of infected eyes the pieces of flannel must not be applied a second time, but thrown away and fresh ones used.

Turpentine stupes (or fomentations) are sometimes used. Mix equal parts of turpentine with sweet oil and apply with the fingers a thin coat to the desired area, over which the hot flannel is applied as described above.

The surface should be wiped dry and reoiled before making a second application.

A *poultice* is a soft, moist application of semisolid consistency and is to be used hot. Poultices may be made from any kind of meal, bread, crackers, etc. Flaxseed meal is generally used, as it is thought to retain the heat better than other materials. A piece of waxed or oiled paper should be cut the size of the poultice required, also a piece of muslin large enough to leave a margin on all sides, and a piece of gauze to cover the whole. The water should be boiling, and the meal stirred in slowly.

Poultices should be made rather soft. When of the right consistency they are to be removed from the fire and beaten until light. No boiling is required after sufficient meal has been added, as it is apt to make it tough, heavy, and uncomfortable.

The mixture should be spread evenly on the waxed paper and the edges of the muslin folded over to form a margin. (This is necessary to keep the poultice from spilling out.)

The entire surface of the poultice should be covered with gauze.

It should be carried to the bedside in heated basins, the skin oiled, the poultice applied and covered with sheet wadding. It should be kept in place with a swathe or bandage.

A poultice for the chest or abdomen should be made about a quarter of an inch thick, as any extra weight causes discomfort. For the face, neck, or limbs it may be made three-quarters of an inch thick without being uncomfortable.

Charcoal poultice is used infrequently, is an excellent deodorant, should be made by first mixing one part powdered charcoal with two parts flaxseed meal which should be stirred into boiling water (as flaxseed poultice).

This should be applied directly to the part to be deodorized.

To make a digitalis poultice:

An infusion of digitalis leaves (two ounces of prepared leaves to one pint of water) into which flaxseed meal is stirred (as flaxseed poultice).

COUNTERIRRITANTS.

Irritants are substances which, applied to the skin, produce vascular excitement, dilating superficial vessels, producing inflammation or vesication. When used to excite reflex influence on a remote part they are called counterirritants.

Counterirritants act indirectly by dilating the vessels in the part to which they are applied, thus diminishing congestion and pressure and relieving pain. They are

only applied directly over the painful area when absorption of the inflammatory products is desired.

There are three distinct classes or degrees of irritation:

Rubefacient, or first degree, irritation produced by mustard, iodine, turpentine, and various liniments, causes redness of the skin (a superficial congestion).

Turpentine used in the form of a stupe.

(Described under Hot Applications.)

Tincture of iodine is applied with a camel's-hair brush or swab of cotton. If the first coat does not produce sufficient irritation, it should be allowed to dry before applying a second time. Care must be taken to make the application evenly. It should never be used directly from the bottle, but a sufficient amount should be poured out and used from a glass.

If the skin be very sensitive and the discomfort unbearable, the iodine may be removed with ether or alcohol.

Mustard may be used as a foot bath with hot water, and as a poultice or paste; also in the form of mustard leaves.

Mustard poultice is made of one part of mustard to four to six parts of flaxseed meal: the proportion depends upon the age of the person, the sensibility of the skin, and the degree of irritation desired, whether a redness or an inflammation of the skin.

Mix the mustard and the flaxseed thoroughly, crushing all lumps. To this add warm water to make the right consistency, stirring constantly. The water should not be too hot, as the volatile oil, which is the irritating property, is driven off in the steam. Beat

the mixture to make it light and spread on waxed paper, placing over the back a piece of muslin, with the edges turned down over the poultice to form a margin; the face of the poultice (the surface to be applied to the skin) should be covered with gauze.

Mustard paste is made in the same proportions, flour being used instead of flaxseed meal. It is more irritating probably because the flour lacks the oil of the flaxseed. A layer of muslin instead of gauze should be placed over the face of a mustard paste.

The surface of the body to which the paste is to be applied should be oiled to prevent blistering.

It must be removed when the desired degree of irritation has been attained. Fifteen to twenty minutes is usually a sufficient length of time.

Liniments are applied to the skin with friction; they are mild irritants, and give a feeling of warmth.

Vesicants, or second degree irritation, cause inflammation and a separation of the epidermis from the true skin, with the exudation of serum between, forming blisters. They may be produced by a second or third coat of iodine; by the prolonged application of mustard poultice or paste or by increasing the proportion of mustard in either; by the saturation of a piece of lint with turpentine, chloroform, or ammonia and immediately excluding the air; and by the use of cantharides, either as a plaster or in collodion.

When cantharides plaster is used the face of the plaster must be oiled, two slits cut to allow the blister to form, and fastened on with narrow strips of adhesive plaster. In applying cantharides plaster to any area, a

series of small squares, not exceeding $1\frac{1}{4}$ inches, should be used, and placed at least one inch apart.

This should be done so that the healing process may be hastened when there is no longer need of irritation. A blister three inches square may take weeks to heal, especially if the condition of the patient is poor, while the same area broken up into a series of small ones heals quickly.

When the plaster is fresh, a blister forms in from six to eight hours. It can be watched easily, as the slits cut in the plaster allow it to swell. If thoroughly oiled there is no danger of breaking the skin when it is removed.

Usually the blister is opened and dressed with ointment, cold cream, or vaselin. With a pair of pointed scissors, which have been sterilized, a small cut should be made at the edge of the blister and the escaping fluid caught on a piece of sterile cotton or gauze.

Cantharides should not be used if the patient has any kidney trouble, as it is a direct irritant to the kidneys.

Acute nephritis has been known to develop in persons who were susceptible to the drug.

CUPPING.

Dry cupping when applied a short time produces first degree irritation. Dry cups are of most value in congestion of the lungs due to poor heart action. The difficult breathing which is the result of this congestion is greatly relieved. A sufficient number should be

applied to cover nearly the surface of the chest. When the last one has been applied the first one should be removed and reapplied in a different spot. This may be continued for any length of time; a dry cup must not be allowed to stay in any one spot over five minutes.

To apply dry cups, prepare the bed by protecting it with *all wool* blankets. One should be put under the patient's back to come up over the pillow and cover the patient's hair, and a second one to cover and protect the spread and top sheet. Wool does not burn readily, and the danger of setting fire to the bed is avoided. A tray should contain several cupping glasses, or small tumblers which have a thick round edge may be used; spirit lamp; cup of alcohol; swabs;[1] extra cotton; matches; extra cup or basin for used swabs, etc.

Dip the swab in alcohol, light, and apply to the inside of the glass, invert and apply quickly, taking the precaution not to use more than just sufficient alcohol, so that it will not burn in the glass. Injury may be done by the heated edge of the glass or by burning alcohol dropping on the skin.

To remove the glass, pass the finger under one side and allow the air to enter.

Wet cupping is nearly obsolete. It consists of making several cuts through the skin and over them applying cups as described above. The skin should be prepared as for a surgical operation.

Leeches are seldom used except by the ophthalmic

[1] Swabs may be made by winding a small piece of absorbent cotton about the end of a probe or applicator.

surgeons to relieve congestion and inflammation of the eye and to relieve and prevent discoloration after an injury. They are applied on the temple about one inch from the corner of the eye.

The skin should be washed with soap and water, then rinsed with alcohol, and lastly with sterile water. Leeches will not bite if the skin is not clean, neither do they like soap and water. It may be necessary to prick the skin and draw a drop of blood to induce them to bite; each one should be put into a test-tube separately, the pointed end (which is the biting end) toward the mouth of the tube, and the test-tube inverted directly over the spot desired.

When full the leeches will drop off. They should never be detached roughly. When full they may then be dropped into a basin of salt and water, and when they empty themselves of the blood they should then be returned to the box of earth in which they are kept.

COLD APPLICATIONS.

Cold is applied locally to lessen congestion and relieve pain. It also retards suppuration and lowers temperature.

Iced compressors and rubber ice-bags of various shapes are in most common use. Ice-coils and ice-poultices are used occasionally.

To fill an ice-cap, collar, or bag, the ice should be crushed very finely, and the bag filled one-half or two-thirds full. The air is expelled by twisting the bag above the ice before screwing on the cover. For the

chest or abdomen it should be put into a flannel cover. A cotton cover is used for other parts of the body.

Ice-coils are sometimes used because they are lighter. They consist of coiled rubber tubing. Two long ends serve to siphon the water from one receptacle, which is placed on a stand by the patient, through the coil into a second receptacle, which stands on the floor. The upper end of the tube may be supplemented by attaching a bulb syringe, which may be left on, to start the flow of water at any time. This is convenient when the tube becomes clogged, as it often does.

Iced compressors are made of old cotton cloth, cut the required size, wet, and laid on ice until cold, then applied. The mistake should not be made of using several thicknesses, thinking thereby to save time and labor. They will keep moist, but they will also become very warm. Instead of an iced application it is warm, and partakes somewhat of the nature of a poultice.

In some cases the continued use of ice is accompanied by considerable danger. The pain may be relieved, while a suppurative process is going on unnoticed, because the patient is comfortable. This is particularly true in the use of ice for earache.

The application of extreme cold should not be made without the sanction of the physician, and unless the patient can be carefully watched.

CHAPTER XII.

SIGNS AND SYMPTOMS.

Development—Color of the Skin—Mouth Breathing—Nausea and Vomiting — Expectorations — Diarrhea — Distention — Pain — Chills—Convulsions.

Symptoms are those conditions or features of conditions of which the patient himself is aware or of which he complains.

Signs.—(Physical signs) are evidences of those conditions which the physician may see, hear, or feel. For example, a patient who complains of pain with every breath consequently takes quick, shallow breaths. This pain is a symptom, the character of the respirations a sign that he probably has pain; just what the *cause* may be must be determined by examination.

Thus the study of physical signs lies chiefly with the physican. Symptoms in a way, to that of the nurse, who by the skilful application of nursing methods makes patients comfortable, remembering that no symptom is too trivial to be regarded if it troubles the patient.

Nearly every disease presents a group of signs and symptoms, characteristic of that disease, and by this group it is recognized. One disease complicated by another somewhat modifies the signs, but the characteristics of both present themselves.

That a nurse may be of value to patient and doctor alike, it is essential that she observe and report any abnormalities or conditions that exist, and learn to report them clearly and concisely, making a plain statement of facts.

There are conditions or symptoms which may exist in any case important for a nurse to observe, and which may have a distinct bearing on the treatment, and possibly the ultimate recovery of the patient.

Development.—First it should be observed if the patient is properly nourished, also if there be obesity or great emaciation. In children the large, flat head, inability to sit up or walk (a condition known as rickets) are all evidences of poor nutrition. This is not always due to an insufficient amount of food—in bulk—but sometimes *improper* food.

A deformity in an adult may be due to some past condition. In a child it may be due to some present trouble. The nature and extent of the deformity should be carefully noted.

The position the patient assumes, be it either child or adult, is that which gives the greatest degree of comfort. For example, one with colic doubles up, and draws the knees close up to the body; one with difficult breathing assumes an upright position; the baby puts its fingers in the mouth when teething, or the hand to the ear, holding the head on one side if the ear aches.

The Color of the Skin.—If it be white, with a transparent, waxy look, it is usually due to anemia, a condition of the blood. A sudden pallor may mean faintness or pain. A gradually increasing pallor, with blue lips

and circles around the eyes, accompanied with restlessness; a low or subnormal temperature; rapid pulse, increasing in rate; "air hunger" and thirst are signs of hemorrhage. *It may be concealed.* But it is none the less important, and is one of the gravest of emergencies.

Blue color denotes an insufficient amount of oxygen, which may be due to either the heart or the respiratory organs. A yellow skin (jaundice) is usually indicative of gall-bladder trouble or some obstruction of its ducts.

Any eruption, its character and extent, are of importance; scars, either the result of surgery or old ulcers, their location and color, should not be overlooked.

The Eyes.—The eyes afford an important index to the mental condition. Their movement, expression, and the size and reaction of the pupils should be noted.

The Mouth, Tongue, Nose, and Lips.—The mouth, tongue, and lips; whether they be moist, dry, cracked, or bleeding; if there are ulcers on the tongue or inside of the cheeks; if the tongue is coated, and its character also if it be tremulous.

Any discharge from the nose may mean a local or cerebral condition. It is particularly apt to be cerebral if the discharge be purulent. A bloody, mucous, or serous discharge is more likely to be local.

Mouth breathing, particularly in children, is rather common. It may mean only a temporary condition, or it may be due to adenoids, the removal of which may become necessary, as permanent obstruction may be the cause of deafness.

It is possible for a person to modify the respiration

to a certain extent, but the type, frequency, and ease should be noted, also if the symmetry in the action of the chest is lost. It frequently occurs in persons who have had pleurisy that one side of the chest is nearly or quite normal, while on the other side there is little or no action.

Retraction of the soft parts, below the sternum and clavicle, sometimes even between the ribs, denotes obstruction of the larynx. In diphtheria or croup it is an important symptom, and one which should never escape the notice of a nurse. It may develop suddenly, and therefore one should be constantly on the watch, for when it occurs no time should be lost in reporting the symptoms.

Nausea and Vomiting.—When nausea or vomiting occurs, the time, quantity, and quality are of importance. If it be directly after taking something into the stomach, food or medicine, it shows that that particular article has caused irritation, or there may be persistent vomiting. Occasionally a person may vomit large quantities of fluid even when nothing has been taken by the mouth for a number of hours, possibly all night. This is probably the normal secretion of the stomach which cannot leave by the natural exit, showing there is an obstruction. This is often caused by cancer.

Blood vomited, if fresh, clotted, or mixed with particles of food, is easily recognized, but when acted upon by the gastric juice it has the appearance of coffee-grounds, or it may be decomposed and black (the so-called "black vomit").

Blood from the stomach differs greatly from that

from the lungs. From the latter it is bright red and filled with air, making it frothy.

The green or bilous vomitus is due to the presence of bile and may occur whenever vomiting persists after the stomach has been emptied.

Fecal vomiting may be due to the same condition as in peritonitis. It more frequently is the result of paralysis or obstruction of the intestines.

Pus in vomited material would indicate an abscess of the stomach.

Projectile vomiting (the expulsion of vomitus with great force, often coming through the nose) in an infant may be due to pyloric spasm; in an adult usually some condition of the brain; also often occurs in the last stages of peritonitis.

Expectorations.—Sputum with a foul odor (fetid) usually denotes abscess or gangrene of the lungs.

Purulent sputum containing pus may be from abscess or extended empyema. Purulent may be *fetid.*

Prune-juice sputum occurs in pneumonia. Is thin and streaked with blood.

Rusty sputum is due to blood in smaller amounts.

The characteristic sputum of tuberculosis is thin and watery in which there are solid coin-like masses which sink to the bottom of the fluid. Often called "nummular."

Cough.—A cough is caused by some irritation of the respiratory tract and is usually described as "dry," if the sputum be scanty or absent, and "loose" if abundant. A dry cough may have a slight, rather constant "hacking" sound, or may be loud, hard, ringing or barking.

Whenever a cough is accompanied by expectorations, their character should be carefully noted.

Stools.—If there is diarrhea present it is necessary to know the character and frequency of the evacuations. There may be blood and mucus, or large watery stools.

Clay-colored stools denote the absence of bile in the intestines and consequent decomposition of the intestinal contents. Usually occurs in inflammation or obstruction of the bile ducts.

Slow bleeding into the intestines is evidenced by the "coffee ground" if digested, or black stools if decomposed blood.

Distention of the abdomen may be caused by either gas or fluid. If gas, it is indicative of obstruction due to tumor or adhesions, or may be caused by a temporary loss of the peristaltic movement of the intestines. If a quantity of fluid collects in the abdominal cavity, a diseased condition of the heart, kidneys, or liver may be the primary cause. With this condition there is likely to be edema (a swelling in which the cell spaces are distended with fluid). This pits upon pressure.

The temperature, pulse, and respiration afford important symptoms and have been discussed elsewhere.

Pain.—Pain of all symptoms is the one which most interests patients. It is too little understood that pain is a *sensation,* hence a phenomenon of consciousness. To one too unconscious to feel there is *no* pain, no matter how badly the body may be injured.

Pain never is "imagined." Imagination may be the cause, but the *discomfort is very real,* and one suffers

just as truly as if it were caused from disease. We may consider pain as purely a mental condition. It is a very well-known fact that pain may not be in the place where one thinks it is felt (referred pain). Severe pain may be distant from the seat of disease, as headache or backache in pelvic trouble, or down the left arm in heart disease.

Symptoms may be misleading, but if one searches for signs in practically all cases the real trouble is located.

Chills.—Chills are nervous phenomena varying in intensity from slight shivering to involuntary movements of sufficient strength to shake the bed; they may be caused by coming in contact with something colder than the body, or by poison (infection) taken in, which acts on the nervous system. This is the most frequent cause. Chills are an accompaniment of local infections, and diseases which are rapid in their onset are ushered in with a chill. After a chill the temperature may be elevated to 104° or 105° F., dependent upon the cause of the chill, and the pulse and respiration affected in proportion to the degree of temperature.

Convulsions.—Convulsions indicate an irritation of the nerve cells of the brain resulting from various causes, among which are kidney diseases, lead poisoning, paralytic dementia, some local destructive disease of the brain, tumor of the brain, or scar tissue, the result of some previous injury.

Convulsions resulting from any of the above causes are symptomatic, while those of epilepsy are idiopathic.

A patient in convulsions should be kept from injuring himself, and if they are so severe that there is danger

of the patient's succumbing to physical exhaustion, ether or chloroform should be administered.

The nurse should observe the pupils of the eyes, their relative size, and whether they react to the light; the cry which precedes the convulsion and its character; the time the attack comes on, as an epileptic attack may come in the night, or when a person is sleeping; an hysterical attack does not thus occur; whether the patient loses consciousness at once or gradually. It is important to note the order in which the movements appear, also their character.

CHAPTER XIII.

URINE.

Normal and Abnormal—Catheterization and its Relation to Cystitis—Bladder Irrigation—Preparation of Specimens—Twenty-four-hour Amount—Simple Tests.

THE urine affords the most important index of the amount of waste excreted by the body. It is dependent upon the perfect action of the kidneys, modified to a greater or lesser degree by the food and the amount of fluids ingested. Hence any abnormality in the urine is of utmost importance.

Color varies from a pale amber to a brownish shade; this variation is due to the relative amount of coloring matter held in solution.

The reaction of normal urine is acid. The degree of acidity varies at different periods of the day. Urine voided in the early morning is strongly acid, while that passed during, and after digestion, especially if the food is largely vegetable in character, is neutral or may be slightly alkaline.

The specific gravity is 1.015 to 1.025.

Of the total quantity of urine voided in twenty-four hours (3 pints or 1500 c.c.) the normal constituents are:

	Grams.
Total quantity	1500.00
Water	1440.00
Solids	60.00
Of the total solids:	
Urea	30 to 35.90
Uric acid	.75
Sodium chloride	16.50
Phosphoric acid	3.50
Sulphuric acid	2.00
Ammonia	.65
Chlorine	11.00
Potassium	2.50
Sodium	5.50
Calcium	.26
Magnesium	.21
Creatinin	.90

The most abundant constituents are water, urea, and sodium chloride.

When only a small amount of urine is voided in twenty-four hours it is usually of a high color. It is still normal if the requisite amount of solid matter is present; this is particularly noticeable in patients with high temperature, being due to depletion of fluids in the body. Such urine, upon standing, throws down a sediment resembling brick-dust in color. This will disappear upon heating or adding water, again showing concentration.

A sediment which will *not* disappear upon the addition of water is usually pus. Decomposed pus renders urine thick and ropy.

Abnormal color is due to bile, blood, or the administration of drugs.

Blood from the bladder, if fresh, gives to the urine a bright red shade; if from the kidneys, usually a smoky, brown, or black color. The difference in shade is due to the quantity of blood and amount of decomposition which have taken place.

Urine which contains blood (unlike high-colored urine) will retain its red shade when water is added so long as any color remains.

Bile gives to the urine a dark-brown, greenish, and in extreme cases an almost black color. This may be recognized by the yellow stain which it gives to white fabric (paper or cloth).

Urinalysis. — Abnormal constituents are albumin, sugar, casts, indican, acetone, diacetic acid, mucus, blood, calculi.

It often becomes necessary for nurses to make simple tests for albumin, glucose, pus, or bile. One should also know how to test for the reaction and specific gravity.

Important points to be recorded are:

Name date hour sex

Amount for twenty-four hours.
Color.
Specific gravity.
Reaction.
Albumin.
Sugar.
Bile.
Sediment.

These abnormal substances are determined by boiling and by chemical tests.

Specific gravity is the weight of any fluid compared with that of some standard fluid; water at its greatest density (4° C.) is understood (if no other standard is mentioned).

One c.c. of water at 4° C. weighs 1 gram.

One c.c. of urine may weigh from 15 to 30 milligrams more than the water. Hence the specific gravity of urine is 1.015 to 1.030. This shows the amount of solids contained.

Method of Testing Specific Gravity.—The urinometer glass should be about three-fourths full and stand absolutely level. The urinometer should be put in to touch the bottom of the glass, then allowed to find its proper level. The last mark below the surface of the fluid (the meniscus) is the proper specific gravity. This should be read through the fluid from below.

Reaction is tested with litmus paper. Red litmus is turned blue by an alkali. Blue litmus is turned red by an acid.

Sometimes red litmus is turned blue, and blue litmus turned red by the same specimen. This is due to the presence of acid and alkaline salts.

Albumin Test with Nitric Acid.—Put a small amount of filtered urine in a test-tube; with a pipette carry an equal amount of nitric acid to the bottom of the tube, allowing the urine to remain on top.

If albumin is present a white precipitate forms a zone or ring at the junction of the two fluids.

Heat Test.—Filter and render acid by addition of a few drops of acetic acid a test-tube half full of urine; boil the upper half. Any opacity will be due to albumin or phosphates; to determine which the addition of three or four drops of acetic or nitric acid will clear the specimen if the opacity is due to phosphates, and further precipitation will occur if it is due to albumin.

Sugar.—The sugar which usually occurs is glucose.

The Fehling Test.—If albumin is present, boil, add a few drops of acetic acid, then filter before testing for sugar. This should be done as a routine.

Having filtered out albumin (if there be any), mix in a test-tube about 1 c.c. of Fehling's A and B, add 3 c.c. of water and boil. This is to determine if the solution will form a precipitate. If none is formed add ten drops of urine. A red precipitate indicates that sugar is present. If the solution remains clear, heat a second time when, if a precipitate appears, the test should be repeated, omitting the last heating and allowing the solution to stand for twenty-four hours, when precipitate forms if sugar is present.

Quantitative tests are not usually required of nurses.

Pus is best determined by aid of the microscope, though it may frequently be seen in considerable quantities.

The sediment may be due to any of the salts which occur in normal urine (when the twenty-four-hour amount is small, these salts recrystallize when urine becomes cold), or to abnormal organic and inorganic constituents, which are demonstrated by various tests and the aid of the microscope.

Retention.—The condition in which urine is secreted and retained in the bladder may be caused by stricture, paralysis, unconsciousness, nervousness, or some surgical procedure or injury. This is not considered an especially serious condition, and may be relieved by the use of a catheter.

Suppression.—Suppression of urine means that urine is not being secreted normally; that the poisonous urea is not being thrown out of the body. Suppression is, therefore, an important symptom, and indicative of some impairment of the kidneys, and sooner or later the patient must, in some degree, succumb to uremic poisoning, with possibly convulsions, coma, or death. Complete suppression results in death in a short time.

Incontinence.—Incontinence of urine is the inability to retain it in the bladder; paralysis or unconsciousness may be the cause. An overdistended bladder will cause incontinence. Catheterization at regular intervals will relieve this condition.

Catheterization. — Catheterization is withdrawing urine from the bladder by use of the catheter under the influence of bacteria. Urine decomposes quickly, furnishing for them a suitable medium in which to grow and multiply, causing cystitis (inflammation of the bladder).

Catheterization must be performed under the strictest aseptic régime.

Due consideration should be given to the choice of catheters. The glass catheter, which may be kept beautifully clean, is in some cases contra-indicated. It would not be safe to use a glass catheter during

labor, nor in case of a violently delirious or insane patient. A soft-rubber catheter is safer. Even in the hands of an unskilled person, provided those hands are clean, a sterile, soft-rubber catheter can do little harm.

Preparation.—Choose two catheters (always two, in case one may become contaminated in some way), fold them in a towel and boil ten minutes at least. These should be taken to the patient in the basin in which they were boiled and must not be uncovered until used.

At the bedside there should be a basin of water and green soap; a second one of boracic acid, 4 per cent.; pieces of gauze; sponges or puffs, and a kidney basin for used sponges.

If the hands of the nurse are to be prepared at the bedside, there should be ready for her use one basin with green soap and water with a brush and one basin containing 70 per cent. alcohol or bichloride of mercury, 1 to 1000.

Arrange the patient comfortably on a bed-pan, with knees slightly flexed. Fold the bedclothes back to the knees, covering the upper part of the body with a blanket or a sheet; the thighs should be covered with a second sheet, tucking it well down under the buttocks.

Separate the labia and cleanse thoroughly, first with green soap and water, then sponge with boracic acid. (If the patient has any venereal disease, bichloride of mercury, 1 to 2000, may be used, then rinsed off with sterile water.)

If a glass catheter is used, test the end to see that

there are no sharp places, which may be the result of boiling, hold the catheter so that it will not become contaminated and insert quickly about 1½ or 2 inches; *never use force*. In case of obstruction, withdraw the catheter slightly and wait for a minute, then repeat the attempt. A spasmodic contraction of the urethra sometimes takes place which will pass away almost immediately.

If there has been considerable distention, the bladder should never be entirely emptied; 20 to 25 ounces may safely be withdrawn, and the balance allowed to remain for three or four hours, then the catheterization should be repeated. A greatly distended bladder may collapse if completely emptied, causing temporary paralysis after the tissues have been stretched to their utmost.

Cystitis.—The most important treatment in cystitis is local, and consists of catheterization and bladder irrigation. In severe cases the patient may not be able to void urine naturally, and the accumulation of a few ounces in the bladder causes great discomfort, which may be relieved by catheterization, followed by irrigation. Usually 2 per cent. boracic acid, sterile water solution or salt solution may be used, at the temperature of the body (about 100° F.).

A glass or rubber irrigator may be used. Both irrigator and tubing should be boiled, and should be just high enough to enable the fluid to flow without force, a return flow catheter being used.

Or the patient being on the douche-pan, the bladder may be emptied with a soft-rubber catheter, which without being removed, should be connected with the

tube of the irrigator and a small amount of the fluid allowed to enter the bladder. The bladder should be emptied each time through the catheter and the irrigation repeated until fluid returns clear.

To prepare specimens for the laboratory, a clean specimen glass or bottle should contain not less than 5 or 6 ounces, enough for all the tests it may be necessary to make. The name of the patient, ward, and bed number, and the time when the specimen was obtained should also be attached. If it be a catheter specimen, or a twenty-four-hour specimen, that fact should be plainly written on a label and attached to the bottle or glass, which should be covered to prevent contamination.

Should the specimen be wanted for bacterial examination, it should be a catheter specimen drawn directly into a bottle which has been sterilized and the mouth stopped with sterile non-absorbent cotton.

To obtain a specimen of twenty-four-hour urine, the bladder should be emptied at a certain hour. From that time all urine should be saved until the same hour the following day, when the bladder should again be emptied. A twenty-four-hour specimen is taken from this amount. It should be marked *twenty-four-hour specimen*, so as not to confuse it with a morning or fresh specimen.

CHAPTER XIV.

EMERGENCIES.

Hemorrhage—Syncope—Epilepsy—Hysteria—Poisoning—Lavage — Artificial Respiration.

HEMORRHAGE.

HEMORRHAGE is the escape of blood from some part of the vascular system. It may be internal or external, and is usually caused by a wound (traumatic) or by a disease condition (spontaneous).

An injury may be accompanied by more or less bleeding; therefore, most hemorrhages are traumatic, and are serious in proportion to the amount of blood lost.

When the bleeding occurs from a superficial vessel it is easy to distinguish an arterial from a venous hemorrhage. The blood from an injured artery flows in jets, is bright red in color, and comes from the side of the wound nearest the heart. The blood from a vein is dark red in color, and flows in a steady stream, and comes from the distal end. If a deep-seated vessel is injured it is impossible to distinguish whether the blood is from a vein or an artery, because the blood wells out and fills the wound.

Capillary hemorrhage usually comes from a large, denuded area.

Hemorrhage may be checked or controlled (1) by always, if possible, elevating the bleeding part, and (2) by applying pressure, either direct (at the bleeding point) or along the course of the vessel.

Direct pressure may be made by packing the wound, by a pad tightly bandaged over it, or in extreme cases by making pressure with the fingers.

Indirect pressure may be made by placing a small pad over the bleeding vessel above the wound if it be an artery, below the wound if it be a vein, and by a tourniquet or Esmarch bandage.

Hemorrhage is sometimes checked by the application of heat, hot water douching, or towels wrung out of hot water and applied with slight pressure. The latter is generally used in capillary hemorrhage. Also by the application of cold, in the form of ice, iced water, or ice-bags.

The surgeon generally uses torsion, which is done by twisting and crushing the end of a vessel, and ligation, which, of course, is the safe and sure way.

Astringents are used internally and externally. Ergot and adrenalin chloride are the most useful; ergot is given internally, and adrenalin may be used both internally and externally.

Styptics are seldom used, because of the danger of infection.

A hemorrhage from a large artery may cause death in a few minutes. Hemorrhage from a small artery will surely cause death if not controlled.

Primary hemorrhage occurs at the time of the injury or operation. Secondary hemorrhage may occur at

any time after the primary bleeding has been stopped; it may be by the slipping of a ligature or by sloughing.

In hemorrhage from internal parts the blood may not be expelled for some time, as in intestinal bleeding, or the bleeding from gastric ulcers, or it may be *entirely concealed* and the person bleed into his own body cavities. It is only by general symptoms that such a condition can be recognized. The symptoms are: A bluish-white pallor with blue circles under the eyes, blue lips, and finger-tips. A weak, irregular, or rapid pulse, usually increasing in rate. Restlessness, increasing up to a certain point. Thirst. Air hunger. A falling temperature. The skin is usually cold. Shallow, sighing respirations.

In spontaneous hemorrhage from any part of the body, as in the nose, throat, lungs, stomach, intestines, uterus, etc., it is necessary to keep the patient as quiet as possible, and in the recumbent position, so as to give the heart the least amount of work. If the hemorrhage has been severe, it often becomes necessary to supply the body with fluid, which may be done by means of a hypodermoclysis or intravenous injections of salt solution. This is not done until the bleeding has been controlled, as any increase in the blood-pressure prolongs the hemorrhage.

SYNCOPE.

Syncope or fainting is caused by anemia of the brain, induced by poor heart action. The symptoms are

pallor, unconsciousness, rapid or poor quality pulse, feeble respirations, and usually a moist skin.

The patient first feels weak, moisture appears on the face, vision becomes dim, and there is a sound as of running water or the wind blowing the leaves; then he gradually becomes unconscious and falls, not a hard fall, but he generally "wilts down;" if in a chair he may slip to the floor.

It may occur as a result of fright, the sight of blood, or an accident, upon hearing bad news, or because of the "close" atmosphere in a crowded room.

The patient must be placed in the recumbent position, and the head must be lower than the body, so that the blood, through gravity, may be assisted in circulating through the brain. All constricting bands must be loosened, especially about the neck and waist.

Plenty of fresh air must be allowed. Occasionally stimulants are needed.

A prolonged fainting fit is dangerous, because the centers located in the brain, and which control the functions of the body, cease to act when for a certain length of time they are deprived of blood.

EPILEPSY—HYSTERIA.

Epilepsy is a nervous disease characterized by convulsions. It is generally a chronic condition and progressive. There is usually a premonition of the seizure, but the convulsion follows so rapidly that the patient is seldom able to get into a position where he cannot injure himself.

First is the tonic spasm. The patient falls, the muscles become rigid, and because of this rigidity of the respiratory muscles, he becomes cyanotic, and at times almost black. This spasm may last from thirty to forty seconds, sometimes longer. Then the muscles relax and there is involuntary twitching of all the muscles of the body. After a short time, varying from one or two minutes to ten or more, the patient either sleeps or becomes comatose.

Serious injury is sometimes caused by the fall; deep burns, cuts, bruises, and even fracture of the skull may occur.

A patient suffering from epilepsy should be put in a position where the violent movement can do him no harm. A gag or towel may be used to prevent biting the tongue, and he should be watched carefully, but never restrained. It may become necessary to administer ether or chloroform to prevent physical exhaustion.

Hysteria somewhat resembles epilepsy. It is a nervous condition, and convulsions closely resemble those caused by diseases of the brain. Unlike epilepsy the attacks never occur in the night; the movements are not involuntary, but rather studied; such as an effort to perform some act, like pulling the hair, feeling the collar, or beating the hands against anything with which they may come in contact. An hysterical patient never injures himself, either by falling or by any act during the attack. The skin does not change color.

POISONING.

Poisons are substances which taken into the body are destructive to health or life. They are classified according to their action.

Irritant poisons are those which irritate, corrode, or excoriate.

Narcotic poisons are those which produce profound sleep or coma.

Irritants may be either acid or alkaline in reaction, and they may also be narcotic in their action.

Antidotes are agents which counteract poisons. Antidotal measures may be mechanical, chemical, or physiological. The object to be attained is to remove, to neutralize, and to counteract the effects on the body. As much of the poison as possible should be removed by emesis or with a stomach-tube, and the balance neutralized by giving the chemical antidote, which either produces a non-poisonous or an insoluble compound in the stomach. The physiological antidote counteracts or antagonizes the effects of the poison in the system.

While the chemical antidote has no effect on poisons which have been absorbed, the entire antidotal treatment should be carried out, as it is impossible to determine just how much absorption has taken place.

Powerful poisons, as the alkaloids, require powerful antidotes, which should be carefully used, as there is danger of substituting one poison for another.

Emetics should not be given after corrosive poisons; lavage should be used instead.

Emetics in common use are warm water in large

quantities alone, also salt and water, one teaspoonful of salt to a tumbler of water. Mustard and water may be used in the same proportions.

Warm soap-suds are usually effective. Ipecac, sulphate of zinc, tartar emetic, may be used, and apomorphine hypodermically.

There are a number of drugs in common use which are "cumulative" in action: that is, when given in continued doses they accumulate in the body and symptoms of poisoning may result. Others may accumulate because they are given more rapidly than they can be eliminated, or because of an individual peculiarity which makes one more susceptible to the effect of drugs. It is important that these conditions be recognized (which may be classed as chronic poisoning) and the use of the drug discontinued.

Arsenic is "cumulative" in action. It is also an irritant and a narcotic. It is most frequently given in the form of Fowler's solution, and in combination with iron and strychnine or iron and quinine.

Signs of the accumulation of arsenic in the system are: edema and itching of the eyelids, particularly in the morning; slight diarrhea; nausea and possibly vomiting; feeble heart; dyspnea; skin eruptions; and albumin in the urine.

In full toxic doses (which may be in the form of arsenous acid, Paris green, or Rough on Rats), gastro-intestinal or cerebral symptoms may develop. The first are the most common: there are burning pain in the stomach and abdomen; vomiting of bloody mucus; thirst; bloody stools; suppressed or bloody urine;

rapid, feeble heart; cold breath; collapse; death from paralysis of the heart. In the cerebral form the profound coma, like that of opium, comes on suddenly without gastro-intestinal symptoms. The treatment, if vomiting has not occurred, is an emetic or the use of the stomach-tube. The antidote is hydrated iron with magnesia and demulcent drinks, like flaxseed tea or gum-arabic water. Stimulants should be used if necessary. The bladder must be emptied frequently to prevent reabsorption.

Digitalis is cumulutive, a cardiac tonic and vascular stimulant and is also a diuretic and emetic. In overdoses it irritates the mucous membranes, causing sneezing and severe gastric disturbances, nausea, vomiting, and purging, the discharge being a grass-green color. The heart's action becomes affected; the pulse is slow, and may possibly be irregular or intermittent. There is dizziness, also the appearance of vibrating fringes of color around objects. In toxic doses the respiration is first slow, then becomes rapid and feeble; there are also cyanosis, coma, and convulsions. Death occurs by sudden paralysis of the heart.

The chemical antidote is tannic acid. The stomach should then be washed out, as the tannate is not inert. Aconite is the best physiological antidote for large doses, and opium to those of long-continued use.

Strychnine is "cumulative" in action. The first constitutional symptoms are restlessness, with slight twitching of the limbs and stiffness of the jaw; the corners of the mouth are drawn up in an unmeaning smile.

After poisonous doses the symptoms come on rapidly with convulsions, the limbs are rigid, and the head is drawn backward until head and heels nearly meet. The arms are bent and the hands clinched; the jaw is the last to become rigid. The eyes are wide open and staring; the face is first pale and then becomes livid from asphyxia.

The spasms resemble tetanus and follow each other rapidly; the mind remains clear until the end. Death takes place in two to three hours from paralysis of the respiratory muscles.

Tannic acid is the chemical antidote; it should be followed by an emetic or stomach-tube.

Chloral and chloroform are the physiological antagonists. The treatment for strychnine poisoning must be carried out as soon as the drug has been taken, as it is rapidly absorbed and a delay of a few minutes may prove fatal.

Opium and morphine are *not* cumulative in their action, though symptoms of overdosing result when the interval between doses is not sufficient for its elimination to take place.

Signs of overdosing are nausea and vomiting, profuse sweating, depression of the heart action, pupils somewhat contracted, slow respirations, and sleep or stupor.

In poisonous doses there are cold, clammy skin; slow heart action; lost reflexes; minutely contracted pupils; very slow respiration, possibly three or four per minute; coma; death by paralysis of respiration.

If narcotism comes on gradually after giving medi-

cinal doses, the patient should be kept awake until the effects gradually disappear.

The treatment for opium or morphine poisoning consists in the evacuation of the stomach, maintaining respiration, and keeping up the circulation.

The chemical antidote is potassium permanganate, the dose of which should be one-half greater than the amount of morphine taken. When taken hypodermically, both the emetic and the chemical antidote may be omitted.

Atropine antagonizes its cerebral action, also action on the heart and respiration. Strong, black coffee by mouth or by rectum may be prescribed. Caffeine, strychnine, and cocaine also counteract morphine. The faradic current of electricity applied to the chest muscles and artificial respiration are of great value. The bladder should be emptied cautiously with a catheter to prevent reabsorption.

Mineral acids: Hydrochloric, nitric, phosphoric, and sulphuric. The antidotes are alkalies, as sodium bicarbonate, lime water or soap suds, to neutralize the acid. The stomach should be emptied cautiously with a stomach-tube. Stimulants may be given if necessary; also opium for the discomfort, and demulcent drinks.

Carbolic acid: Wash out the stomach with 50 per cent. alcohol (whisky or brandy may be used). Having completely emptied the stomach, three or four ounces of a solution of 50 per cent. alcohol and water (or brandy or whisky may be used) should be given by the stomach-tube and allowed to remain in the stomach.

Sulphate of magnesium and sodium are chemical

antidotes. After their use the stomach should be emptied by lavage, as it is impossible to produce emesis after the ingestion of carbolic acid. Either of the above methods may be used, but alcohol is usually given precedence.

Atropine is a physiological antagonist, and maintains the heart and respiration until elimination occurs, which should be promoted by giving drinks freely. Demulcents may be given to protect the mucous membrane, but no oils or glycerine. The bladder should be emptied frequently.

Alkalies.

For poisoning by ammonia, caustic potash, etc., vegetable acids form the antidotes. Lemon juice, lime juice, and dilute vinegar may also be used. Milk or oil and white of egg are of value. The stomach should be emptied cautiously. Plenty of fresh air is essential. Digitalis is an antagonist. Sedatives may be given if necessary.

Gases, illuminating, carbon dioxide: Fresh air, external heat, and stimulants if necessary, are the antidotes.

Mercury, bichloride, or corrosive sublimate: The external use of bichloride of mercury has been known to produce symptoms of poisoning. An eruption of small pimples appears. The gums and teeth become sore and salivation may follow.

For accidental poisoning by mercury one egg to every four grains of the bichloride; more than this may redissolve the mercury.

Vomiting should be promptly induced and actively kept up for some time after giving the antidote.

The symptoms which accompany large doses of mercury are nausea, burning in the stomach, abdominal pain and diarrhea. The urine is diminished, and may contain blood and albumin, or may be suppressed. In the course of a number of hours, or it may be days, there is collapse, syncope or convulsions, coma and death.

Lavage.

Lavage is the washing out of the cavities of the body, usually the stomach. It is most often used in cases of poisoning to empty the stomach; it is also used as a therapeutic measure in acute or chronic gastritis, in excessive vomiting, and for the chemical analysis of the contents of the stomach.

Necessary Articles.— Rubber dressing-sheets and towels to protect the patient and bed; a slop-jar or some receptacle for the fluid and material washed out; a pitcher of sterile water; salt solution of whatever fluid is to be used, from two to four quarts, at body temperature.

The stomach-tube, funnel, and mouth-gag may be sterilized together and brought to the bedside covered. Patients who are conscious may sit up during the procedure. The head *should not* be thrown back, but held slightly forward. Those who are unconscious, delirious, or hysterical are placed on the back and the mouth-gag used.

The tube should be moistened and passed gently

into the pharynx. If mentally responsible the patient should be instructed to swallow while the tube is being rapidly pushed into the stomach, the distance of which should have first been estimated.

Before pouring the fluid into the tube it is necessary to see that the patient breathes normally, that his color is good (not cyanotic), and that he does not cough. Any of these conditions may indicate that the tube is in the trachea, when it should, of course, be withdrawn. This is a precaution which should never be overlooked even in the gravest emergency.

About one pint of water or solution to be used should be poured into the funnel, then, while about half full the funnel must be quickly inverted into some receptacle which is lower than the level of the stomach, when the fluid poured in and the contents of the stomach will be siphoned out. This should be repeated until the fluid is returned clear.

ARTIFICIAL RESPIRATION.

Respiration is carried on by the contraction and relaxation of the respiratory muscles, by which inspiration and expiration are performed. By producing certain movements the same result is procured, that of creating greater space in the chest, which fills with air, and of forcing the air out.

There are several methods of performing artificial respiration. Sylvester's method is most commonly used, which consists in first raising the shoulders slightly, the head being allowed to drop backward; the arms

between the wrists and elbows should be grasped firmly and the arms swung horizontally away from the body until they meet over the head. This creates greater air space (inspiration), and should be performed slowly, to give the lungs a sufficient length of time to fill with air. The arms should then be brought down across the chest and pressure made against the chest wall, which expels the air (expiration).

Both movements should occupy at least three or four seconds, as not more than sixteen to twenty movements should be performed per minute.

CHAPTER XV.

EMERGENCIES (CONTINUED).

Fractures—Sprains—Dislocations—Burns—Shock.

FRACTURES.

A FRACTURE is a break in a bone which may be complete or only a fissure. When classified according to the nature of the injury there are two distinct classes:

1. The open or compound fracture, when there is an external wound leading down to the seat of injury, usually caused by the sharp end of the bone being driven through the skin.

2. The closed fracture, of which there are several varieties:

(*a*) The simple fracture is a break in a bone without external wounds or complications.

(*b*) The comminuted fracture, in which the bone is shattered or broken in several places.

(*c*) The impacted fracture, in which the ends of the broken bone are driven together.

(*d*) The green-stick fracture—which is like a green stick splintered and broken while the fragments still hang together.

(*e*) The subperiosteal fracture — a fracture of the wrist in which the periosteum is not broken, often spoken of as the "chauffeur's wrist."

A depressed fracture is of the skull; it is only dangerous when both plates of the bone are broken.

In young persons the types most frequent are:

1. The green-stick, because of the excess of animal matter in young bones.

2. Separation of the epiphysis along the epiphyseal line. This is likely to occur up to the age of about sixteen years, or until the epiphysis has united with the shaft of the bone.

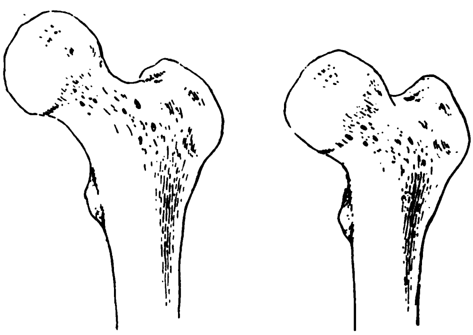

FIG. 10.—Impacted fracture of the hip.

In the old, a not infrequent occurrence is impacted fracture of the hip, the head of the bone being driven into the cancellated portion.

The other types occur in both old and young, and the breaks may be transverse, oblique, or fissured.

Signs of fracture: Abnormal mobility at the seat of fracture. Pain always. Deformity usually; some breaks do not show deformity. Crepitus not always; when present, fracture is positive. In impacted hip and subperiosteal fractures it does not exist. Loss

of function not always; impacted hip and lower end of fibula are exceptions. Discoloration usually, but may be hours or days after the injury. Blebs are apt to occur with the swelling.

Treatment.—First immobilize the part by using some temporary support until the swelling subsides. For a fracture of either bone of the leg a pillow splint may be used, which consists of a soft pillow pinned about the leg reinforced on each side by straight pieces of splint wood and held in place by two or three straps.

This permits the swelling without causing pressure or obstruction of circulation. Later the blebs should be opened with a sterile needle, to allow the fluid to come out, then dusted with an antiseptic powder, as boracic acid. Carelessness in caring for these blebs may result in infection.

A plaster cast is usually the permanent dressing for any fracture below the knee.

For fracture of the femur, the patient should be placed on a Bradford frame with sand-bags until it is safe to use a Buck's extension. For a small child a crane may be used instead of the Buck's extension.

A fractured forearm may be put up in an anterior and posterior splint; as the sides are open there is room for the swelling.

In open or compound fractures the danger lies in infection, because there is always an infected wound. The outcome depends upon the amount of the infection and the virulence of the organism.

The patient is invariably anesthetized, the wound thoroughly cleansed with soap and water and antiseptic

solutions. The bones are then put in apposition, and after the wound has been dressed a plaster cast applied. The plaster is applied at the first dressing of a compound fracture, because the draining of exudation fluid from the wound allows very slight if any swelling.

Later an opening, called a window, is cut in the cast so that the wound may be dressed.

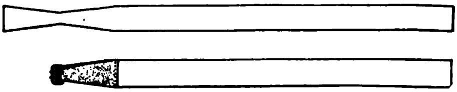

FIG. 11.—Extension straps.

In the first treatment of a fracture there is danger from too tight application of a bandage, plaster, or adhesive straps. The improper application of either of the above may so obstruct the circulation that gangrene may result with amputation of the part following.

To prepare for a Buck's extension the leg should be thoroughly cleaned with soap and water and then shaved. An extension strap is applied to each side of the leg, which may be reinforced by strips of adhesive plaster applied spirally.

An extension strap consists of a piece of mole-skin plaster (which should come above the knee), to which a buckle is fitted; the end is then turned back and stitched, the non-adhesive side of the plaster serving as a facing for the strap.

A sheet-wadding bandage is placed over the strap, padding it well, and last a cotton muslin bandage,

which has been starched, should be soaked in warm water and put on damp. This when dry makes a firm bandage, and one which will not slip. It also keeps clean much longer than the unstarched bandage. At the point of fracture, coaptation splints are applied and kept in place with straps, fastened with buckles.

A T-splint should extend from the foot to the axilla, and be kept in place by being strapped to the leg and by the use of a pocket swathe. The extension straps are then fastened to a spreader and the required amount of weight put on. The foot of the bed should be ele-

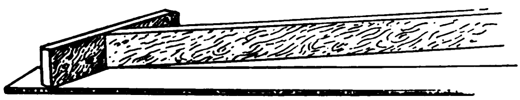

FIG. 12.—T-splint used with a Buck's extension.

vated with bed blocks, the bed making an inclined plane; the weight of the body serves for counter-traction. An unyielding surface is obtained by the use of the fracture board, and for convenience in moving the patient should lie on a Bradford frame.

Articles needed for a Buck's extension are:

Sheet-wadding, 6 sheets.

Straps, with buckles, 6 to 10 (12 and 18 inches for adults).

Safety pins.

Adhesive strips.

Sheet-wadding bandages.

Cotton muslin bandages (starched).

Coaptation splint.

T-splint.

Pocket Swathe.—A swathe with a pocket or straight piece sewed on the outside, through which the end of the T-splint is put.

Extension straps.
Spreader.
Extension pulley.
Weights.
Bed blocks.
Bradford frame.
Fracture board.
Cradle.

Fig. 13.—Extension crane for a child.

Extension for a Child.—When the child is from six months to twelve years a crane may be substituted for a Buck's extension.

The leg is treated as for an adult, then extension is made by passing the rope attached to the spreader through a pulley fastened to the crane. Weights are attached to the free end of the rope.

The leg should be in an upright position; and at right angles to the body, the weight of the body makes counter-traction. This is a simple apparatus and permits of considerable movement on the part of the child without disturbing the position of the bones.

PLASTER CAST.

A car or table should be at the side of the bed, upon which are placed rubber sheets to protect the bed and the floor. A doctor's rubber apron, sand-bags, three for short plaster and five if the plaster is to extend above the knee. Sheet-wadding bandages, to be put on under the plaster; plaster bandages; plaster of Paris, dry, in a basin; a flannel bandage or stockinette tubing to serve for a cuff. This is put on under the first layer of plaster; when the plaster has reached sufficient thickness, the cuff is turned back and fastened down by the last layer of the plaster bandage.

A receptacle of warm water sufficiently deep to allow the bandages to stand on end and still be covered with water.

If salt is added the plaster sets more quickly. The

proportion is one teaspoonful to a pint of water, which should be put in a cup, to be used if desired.

The bandage should be soaked just before using and not allowed to stand in the water after it has ceased to bubble.

That the best results may be obtained, the patient is usually anesthetized when a fracture is put up permanently. Where this is the case, an ether cone, ether towels, tongue forceps, and a kidney basin are necessary.

Fractures may be complicated by sprains or dislocations when in the vicinity of a joint; by laceration of large bloodvessels; also in case of fracture of the ribs or of the pelvis, puncture or injury of the lungs, liver, spleen, kidneys, bladder, or the intestines.

SPRAINS.

A sprain is an excessive strain, laceration, or complete separation of a ligament from the bone at a joint without dislocation of that joint.

The ankle is most often involved. There are pain, tenderness, swelling and discoloration; the seriousness depends upon the extent of injury.

The first treatment required is to immerse the part in water as hot as can be borne until the first sharp pain subsides, then if the injury is not extensive the part should be strapped with adhesive plaster.

If the injury be to the ankle, the patient is instructed to walk as usual. It is found more difficult when the knee is involved, but even in such a case there should be exercise.

When there is separation of the ligament from the bone, the same treatment as for a fracture is indicated —complete rest and usually a plaster cast.

DISLOCATIONS.

A dislocation is the displacement of a bone at a joint. It may be partial, complete, or compound.

A compound dislocation is always a serious injury. The open wound, which is the result of the tearing apart of the soft tissues, results in an infected wound.

Signs of Dislocations.—Pain, deformity, loss of function, and later swelling and discoloration.

There is but little that a nurse can do other than to keep the part at rest and use hot applications. Lead water and laudanum may be applied hot in the form of a fomentation, to lessen the pain.

To reduce a dislocation, an anesthetic is necessary. The part should be immobilized and kept at rest for a few days, the length of time depending upon the extent of the injury.

BURNS.

Burns are among the most frequent emergencies. They are classified according to the extent of the injury into three degrees:

First degree—consists of injury to the epidermis, resulting in its destruction with superficial inflammation.

Second degree—separation of the epidermis from the true skin with injury to the corium. The result is sloughing of the superficial tissue.

Third degree—injury and destruction of the deeper tissues, which may involve muscles, tendons, nerves, ligaments, and even the periosteum.

The mortality from burns depends upon the physical condition of the person and the character and locality of the burns; the chest and the abdomen are the most dangerous localities.

Old persons and children have low resistance and stand burns poorly.

There are two stages to be considered in the treatment of all extensive burns: First the shock, which is immediate and always present. Later sepsis, as there is always sloughing of tissue according to the degree of the injury.

The Immediate Treatment.—Shock should be treated first, then the burns should be dressed. Blebs may be opened with clean, sharp scissors.

It is generally admitted that picric acid gives better results than carron oil dressing, which has been so much used in the past.

Picric acid is not popular because it stains a bright yellow, leaving stains on the nails which will not disappear for months. It should be used in a 2 per cent. solution (saturated). It is an antiseptic, a deodorant, a stimulant, and an anodyne.

Gauze should be saturated and fluffed, not allowed to lie flat against the surface. It should be used because it permits of free drainage. After the daily dressing the gauze may be saturated two or three times during the twenty-four hours without removing from the wound.

After granulations appear, an ointment should be used. Boracic acid is highly efficient, and should be spread on material which does not have wide meshes.

Scarlet-red ointment stimulates the growth of epithelial cells. It should only be used sparingly; a thin layer around the edge of a granulating surface for one day, then skip at least for two days, otherwise the granulations become too exuberant.

In extensive burns a skin-graft is nearly always necessary, as epithelial tissue will not grow across a wide space.

It may be necessary to apply a splint when the skin begins to grow to prevent contracture and deformity from scar tissue.

Burns may be complicated in many ways; the most frequent is acute nephritis, induced by the extra work thrown on the kidneys as a direct result of the injury to the sweat glands.

Pneumonia is a serious complication, and may occur if there has been any inhalation of smoke.

CHAPTER XVI.

WOUNDS AND INFLAMMATIONS.

Classification and Method of Healing.

A WOUND is an injury or separation of any tissue of the body induced by violence either direct or indirect.

They are classified according to the nature of the injury.

Incised wounds are those with smooth parallel edges, which may be made with a sharp instrument, glass, etc., but usually with a surgeon's knife.

Punctured wounds also have smooth edges, but the depth greatly exceeds the extent of injury on the surface. A stab wound is a good example of a punctured wound. If a punctured wound extends to any cavity of the body, it is usually referred to as a penetrated wound.

Contusions are injuries to the tissues under the skin, resulting in the rupture of small vessels and the escape of blood into the cell spaces. A contused wound is irregular, with crushed and bruised edges.

Lacerated wounds are those in which the edges are irregular and torn; there may also be a loss of tissue.

The immediate complications of wound are hemorrhage and loss of function. Loss of function may be the result of a division of muscles, tendons, or nerves.

Secondary complications are due to infection, in which there must be a period of incubation followed by inflammation and probably suppuration and loss of tissue, or general blood infection.

Wounds heal by:

1. **Primary Union or First Intention.**—A clean, incised wound the edges of which are held together is repaired very rapidly. The edges are joined by connective tissue and a thin white scar is formed. The process usually takes about eight days.

2. **By Granulation or Second Intention.**—The process of repair is slower, as new cells must fill up the space made by destruction of tissue. These new cells grow from the bottom and sides of the wound, the epithelium eventually covering their surface.

3. **Repair.**—Repair of a superficial wound is by the formation of a crust or scab over the surface, forming a protection while the healing process is going on underneath.

INFLAMMATION.

Inflammation is Nature's response to injury, and is the first step in the process of repair. It is associated with heat, redness, pain, and swelling.

First the bloodvessels dilate, bringing more blood to the part, or causing congestion, which gives rise to an extra amount of heat and redness. Next there is the transudation of the blood plasma and the migration of the white cells into the cell spaces, forming the exudation fluid, which is always present when tissues are injured.

This results in swelling. The pressure on the nerves, brought about by this condition, causes the pain.

Whenever there is injury to any tissue, this phenomenon takes place. If there be no infection the inflammation subsides and the healing process continues rapidly.

Any wound, however simple, may be complicated by infection and the healing process greatly delayed by the destruction of tissue, the formation of an abscess or phlegmon, by blood intoxication or blood infection, with the ultimate result of loss of function, loss of the part, and possibly loss of life.

No wound, whether clean or otherwise, should be dressed without the utmost surgical cleanliness.

Any person who dresses an abscess, carbuncle, or infected wound without taking every precaution to guard against *further infection* is criminally negligent. Pus is no excuse for dirty fingers.

Hot, moist dressings are usually indicated for infected wounds. These should be of sterile gauze even when used with an antiseptic solution. It is a well-known though inexplainable fact that wounds of this class do better with moist heat than with dry, sterile dressings.

The ends to be met in the treatment of sepsis are:

1. To keep up the resistance of the tissues. (This is done by direct application of heat bringing more blood to the part.)

2. To prevent the further growth of organisms. (The use of antiseptics.)

3. To remove organisms. (Drainage.)

4. To counteract the effect of the toxins in the body.

CHAPTER XVII.

BANDAGING.

Use of Splints, Slings and Supports—Material Used—Methods of Application.

THE word bandage may be used as a noun, meaning a strip of material used to cover a wound, or as a verb.

To bandage is to apply a bandage to any part of the body by successive turns.

Various materials are used, which are chosen according to their usage. They may be used for support, protection, pressure, or to keep a dressing or apparatus in place.

Plaster of Paris, or a cotton roller, which may be starched or used with a splint, is generally used for support.

When used for protection or to keep dressings in place, cotton rollers and muslin and gauze bandages are used. Gauze is to be preferred, as it is cool, comfortable, and easily adjusted.

Flannel bandages, both straight and cut bias, are used for pressure. Occasionally elastic rubber bandages are used for the same purpose, or to control the circulation, but they can only be left on for a short time.

Cotton rollers, starched or otherwise, are used for keeping splints, extensions or other apparatus in place.

A good bandage is one which fulfils its function, whatever that may be, without discomfort.

Bandages vary in size from $\frac{3}{4}$ of an inch wide and 3 yards long to 6 inches wide and 10 yards long, according to the part to which they are to be applied.

The principles of bandaging are few, and consist of several different turns: the circular, oblique spiral, reverse spiral, figure-of-eight, and recurrent.

By the combination of two or more of these any part of the body may be covered.

FIG. 14.—Spiral reversed bandage of the upper extremity. (Wharton.)

A *circular* bandage consists of circular turns, each one entirely covering its predecessor.

An *oblique spiral* consists of oblique turns, each successive turn applied above the preceding one, and overlapping it by two-thirds, can be applied to parts of equal diameter.

The *reverse spiral* is applied to parts which gradually increase in diameter. The turns are oblique and should

lie flat to the surface of the part they cover. The upper edge of the bandage is reversed, or turned down at the median line; the upper edge becomes the lower, and should form a line which corresponds to that made by the lower edge.

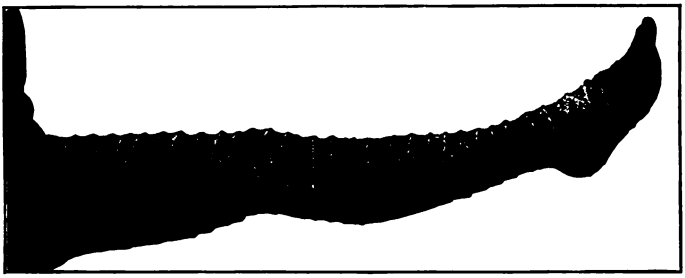

Fig. 15.—Spiral reversed bandage of the lower extremity. (Wharton.)

The *figure-of-eight bandage* may be used instead of the reverse. It is oblique and consists of alternate turns, ascending and descending, which cross at the center, forming the figure-of-eight. The bandage is easily applied and looks neat. It also stays in place. It should only be used, when cut straight, over a splint or heavy dressing as it does not fulfil one of the first principles. It does not lie flat to the surface it covers.

The *reverse figure-of-eight* combines the good points of both the reverse and figure-of-eight. It does lie flat to the surface, also it remains in place as does the figure-of-eight.

After fixing the initial end, carry the bandage up the

limb as in the figure-of-eight, reverse on the posterior surface, then bring the bandage down as in the figure-of-eight.

Fig. 16.—Recurrent bandage of a stump. (Wharton.)

Fig. 17.—Recurrent bandage of the head. (Wharton.)

The *recurrent bandage* consists of successive folds carried back and forth over the part and held in place

by circular turns and securing the end; it is used principally to cover the head, stumps and ends of fingers.

Fig. 18.—Crossed bandage of both eyes. (Wharton.)

Fig. 19.—Barton's bandage. (Wharton.)

To adjust a bandage begin at the smallest part, and fix it by two or three circular turns. If it is a limb

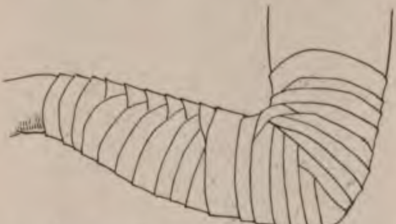

Fig. 20.—Bandage of forearm and elbow (arm flexed).

being bandaged the bandaging should be done toward the trunk, making spiral and reverse or figure-of-eight turns according to the shape of the part.

A bandage for the hand is fixed at the wrist, then with oblique turns it should be carried down to the lowest

FIG. 21.—Demigauntlet bandage. (Wharton.)

FIG. 22.—Spica bandage of the thumb. (Wharton.)

FIG. 23.—Bandage of foot covering the heel. (Wharton.)

point it is to cover, winding upward toward the wrist. The foot and ankle may be bandaged in the same manner.

FIG. 24.—Figure-of-eight bandage of the heel.

FIG. 25.—Figure-of-eight bandage of the ankle.

FIG. 26.—Velpeau's bandage. (Wharton.)

The essentials of a good bandage are:

1. That it must lie flat against the surface it covers.
2. That it must stay in place.
3. That it must not be too tight.
4. That it fulfils the purpose for which it is applied.

A *many-tail bandage* is made of cotton cloth cut to form an equal number of tails on each side. These are brought around the part to be covered and tied in a single knot, each successive pair of tails covering the ends of the preceding pair, the last ones being secured by a bow-knot. Many-tail bandages are used when frequent changing of a dressing is necessary.

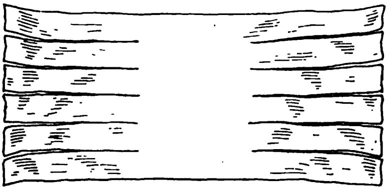

Fig. 27.—Many-tail bandage.

The sling is a form of triangular or handkerchief bandage. It is used for support, and consists of a piece of cotton, one yard square, folded to form a triangle. The point of the triangle should be at the elbow, the folded edge reaching to the tips of the fingers. The outside of the sling should be carried across to the opposite shoulder, the ends tied about the neck, and the corner at the elbow turned in and pinned. Where immobilization is required a double sling may be used. The first is applied as described above. In the second

the folded edge at the waist is carried around the body and secured by pins under the arms. The point at the shoulder is turned in and fastened in the same

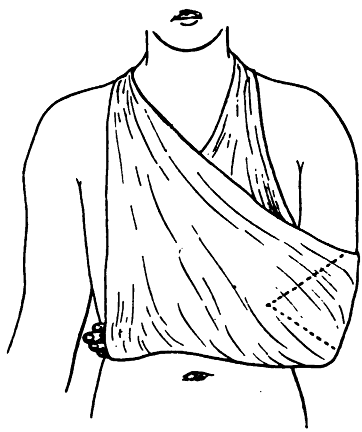

FIG. 28.—Sling.

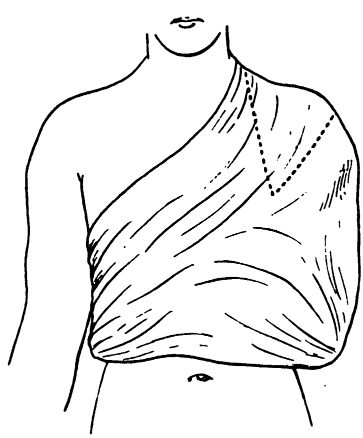

FIG. 29.—Second sling.

manner. It should be firmly applied, in the back completely covering the scapula on the injured side.

FIG. 30.—Lund swathe (front).

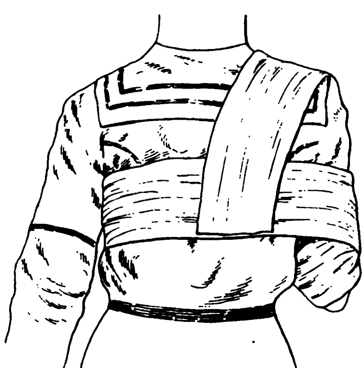

FIG. 31.—Lund swathe (back).

The *Lund swathe* affords efficient means of support and immobilization, and is particularly useful for chil-

dren. It is made according to the size of the patient. For an adult a piece of cotton cloth 3 yards long and 16 inches wide is necessary. Both edges should be folded into the center, then again folded through the center, making when finished a swathe 4 inches wide and of four thicknesses.

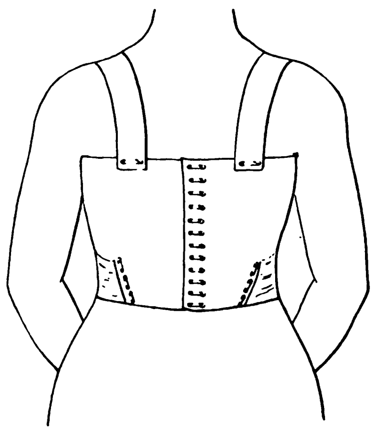

FIG. 32.—Straight chest swathe.

To apply this kind of swathe, the hand of the injured side should be placed on the opposite shoulder. The first end is fastened about the injured arm half-way between the shoulder and the elbow; the swathe is then carried across the back, under the arm on the opposite side, across the chest, over the arm and forearm, under the elbow from the outer side, up over the shoulder and fastened to the circular turn in the back with safety-pins.

A swathe is a straight bandage made of two thick-

nesses of material, usually canton flannel. It may be used to cover or hold in place chest or abdominal dressings, or applied to the chest to restrict the movement in respiration.

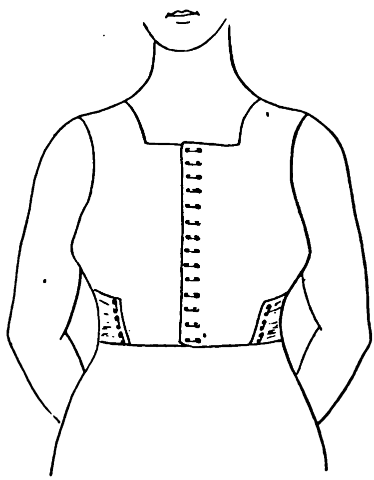

FIG. 33.—Fitted swathe with shoulder straps.

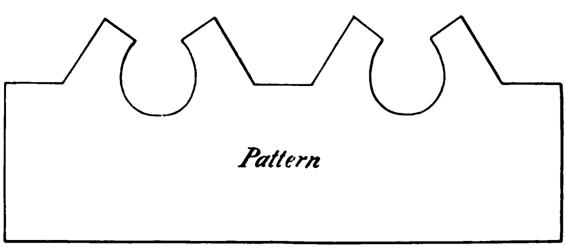

FIG. 34.

An abdominal swathe varies in length and width. It should be long enough to pass around the body over

the hips, and wide enough to extend from the symphysis pubis to the lower border of the ribs.

A chest swathe should extend from the axilla to the lower border of the ribs and be held in place with shoulder straps.

To adjust, it is best to begin at the bottom and pin upward, making darts on each side, so that it may fit smoothly.

SPLINTS.

Splints are made of rigid material and are used for support, to immobilize and to hold broken bones in place.

FIG. 35.—*1*, T-splint; *2*, coaptation splints; *3*, anterior and (*4*) posterior splints for wrist; *5*, splint wood.

A splint may be formed from a bandage, as plaster of Paris, or many thicknesses of starched crinolin.

Wood, tin, iron, wire, aluminum, felt and waterboard[1] may be used.

Tin is possibly used more than any other material, as it has the advantage of being less cumbersome.

[1] Waterboard is a form of paper which may be soaked in warm water and moulded to fit the part to which it is to be applied.

Whatever material used a splint should be padded with non-absorbent cotton (sheet wadding is best) and smoothly covered. It should be long enough to immobilize the joint above and below the injury.

When a splint is to be applied, the skin should be washed with soap and water, bathed with alcohol and powdered.

Fig. 36.—*1*, *2*, ham splints; *3*, shoulder cap (for fractured clavicle); *4*, *5*, *6*, anterior angular splints (for fractured elbow).

Strips of adhesive plaster or webbing straps with buckles may be used to hold them in place. The *circulation* must not be restricted, but at the same time they must be so firmly adjusted that they will not slip nor cause chafing.

STRAPPING.

Strapping with adhesive plaster is to immobilize while allowing partial use of the part. The chest is strapped for fracture of the ribs and to restrict respiratory movement in pleurisy. Strapping is used to give support to the ankle, knee, or wrist in sprains or other

injuries. The part to which straps are to be applied should be washed and shaved.

For the chest, the straps should be about three inches wide and long enough to pass half around the body and across the sternum in front and the spinal column in the back.

The strapping should be begun at the bottom, one end fixed across the spinal column on the opposite side; the patient directed to take a long breath, then to expel the air; while the chest is comparatively empty draw the straps tightly around and fix the other end over the sternum. The second strap should overlap the first by one-third, and should first be fixed in front, then carried around to the back, and continued in this manner to the axilla. The ends should be covered with a narrow strip to prevent rolling up.

For the knee strips $1\frac{1}{4}$ inches wide, and long enough to pass half around will be required. The first four should be applied nearest to the patella by fixing the outer end first and drawing each strap toward the center, crossing the ends above and below the patella; each strap should overlap the preceding one by one-third. A bandage is preferable for keeping the ends from rolling in this locality.

To Strap the Ankle.—Place the heel on a foot-rest, pass a strap or bandage back of the "ball of the foot" and allow the patient to hold the ends so that the foot will not become extended. The straps of adhesive are made one inch wide and long enough to extend three or four inches above the ankle. The end on the inner side should be adjusted first, well up on the

ankle; it should be drawn tightly under the heel and up on the outer side, passing just back of the malleoli. The second should be fixed just back of the big toe and brought around back of the heel to the little toe. Alternate straps are applied in this manner until the ankle is well covered and finished with a narrow strap across the ends to prevent rolling up.

In cases where the ankle rolls inward due to relaxed muscles or "flat-foot" the order of applying straps should be reversed and the first end should be fixed on the outer side and straps drawn tightly inward.

CHAPTER XVIII.

THE CARE OF THE EYES AND EARS.

THE CARE OF THE EYES.

As a rule no organ is so universally abused and so poorly cared for as the eye. The knowledge necessary for the intelligent care of the eyes in diseased conditions can only be gained by a special training.

In the general care of the sick it often becomes necessary to wash out the eyes; to put in drops or powder; to apply ointment or compresses, either hot or cold.

The sickest patients, particularly those suffering from various forms of nervous diseases, meningitis or unconsciousness, may lie with eyes open. Particles of dust containing bacteria may fall on them, causing irritation and inflammation. The tears are not diffused over the surface as in normal conditions, the conjunctivæ become dry with possible ulcerations, which are likely to occur over the cornea, this being the most prominent part of the eye.

Such eyes should be washed out frequently with sterile water or boracic acid 2 per cent. Pieces of gauze should be wet and laid over them; this prevents the dust from getting in, and at the same time keeps them moist.

To wash out the eyes, separate the lids with the finger and thumb of one hand, making the pressure necessary to keep them open on the bony prominences above and below the eye. Direct the stream from the inner angle outward; this is necessary in order to prevent the discharge, if there be one, from getting into the other eye; the eye should be wiped in the same direction. A soft-rubber bulb syringe or pieces of absorbent cotton may be used.

FIG. 37.—Method of putting drops into the eye.

To put drops into the eye, separate the lids, drawing the under one well downward; this forms a shallow pouch, into which from the *outer angle* the drops should be put, taking care that the dropper does not come in contact with any part of the eye. When using atropine it sometimes becomes necessary to close the tear-ducts by gentle pressure at the inner angle, to prevent the drug from passing through the ducts and thence into the throat.

Ointment may be applied with a swab made of an

applicator and absorbent cotton. The lids should be separated and the ointment applied on the inside of the under lid; the eye should then be closed and the ointment diffused over the surface by a gentle rotary motion of the finger on the outside of the lid.

Powder may be shaken from a camel's-hair brush directly into the eye, which is held open as described above.

THE CARE OF THE EARS.

Neglect of earache often results in serious complications. A discharge accompanied by occasional attacks of dull pain, and a discharge without pain or the sudden onset of acute pain, are important symptoms.

Earache, sudden in its onset and accompanied with a sharp, "crackling" pain upon swallowing, is the result of acute inflammation of the middle ear (otitis media), and may follow or complicate any of the infectious diseases, the infection extending from the throat through the Eustachian tube, or it may be carried by the blood stream.

Neglect of any of these conditions may result in deafness (partial or complete), mastoiditis, meningitis, brain abscess, inflammation of the large bloodvessels, and the formation of clots creating an embolism, or general infection of the blood stream and death.

In acute otitis media or mastoiditis, ice is usually applied to relieve the pain and inflammation. It should be remembered that this must be constant. The ice-cap should be large enough to cover the entire side of the head, and should be filled only about half full;

it should never be allowed to become even slightly warm.

The extreme cold may be borne better if the ice-cap is covered with a flannel cover.

FIG. 38.—Ear irrigation.

Aural Douches or Irrigations are used for cleanliness and to reduce inflammation. When used for cleanliness, a mild antiseptic is used, the temperature of which should be about 100° F. When used to reduce inflammation, sterile water or 2 per cent. boracic acid solution, which should be of a temperature of 110° to 118° F. If the solution is too cold it often causes faintness.

The irrigator should not be high enough to give any amount of force to the stream. Too much force has produced unconsciousness. The stream should not be directed straight into the ear, but against the posterior wall; it will then flow in without causing pain or dizziness.

The auditory canal, which is curved, should be straightened in an adult by lifting the auricle upward and backward; it may be done in a child by pulling it downward and outward.

After an irrigation the canal should be thoroughly wiped out, small twists of absorbent cotton being used to absorb the fluid. Probes, applicators and forceps should never be used in the ear, as by any sudden movement of the patient he may do himself considerable injury.

CHAPTER XIX.

ANESTHESIA.

Preparation and After-care—Ether Bed.

PREPARATION AND AFTER-CARE.

ANESTHESIA is loss of sensation, in whole or in part, due to a condition of the nerves, or brought about by the administration of drugs.

Drugs which produce loss of sensation are anesthetics, and are of two classes:

Local, those which are applied to an area and act by causing loss of sensation in that particular part, by paralyzing the nerve endings. Those most often used are cocain, novocain and ethyl chlorid.

General anesthetics act directly on the nerve centers and produce unconsciousness. Ether, chloroform, and nitrous oxide are most commonly used. The preparation for general anesthesia is the same, regardless of the agent used.

The stomach should contain no solid food. All food must be omitted for twelve hours, when possible; clear broth or black coffee may be given six hours before, then nothing but small amounts of water.

The night before taking an anesthetic a laxative should be given and in the morning an enema of suds, making sure that the rectum is empty.

The bladder should be emptied naturally if possible, otherwise by the catheter.

Particular attention should be given to the patient's mouth. The teeth must be thoroughly cleaned with a brush and peroxide or other antiseptic, the mouth washed out, and the throat gargled (when the patient is able to do so), as a routine, every four hours from the time the preparation begins until the patient goes to the etherizing room. False teeth on plates must be removed.

During the period of unconsciousness, material from the mouth may be drawn into the air passages. If this has been rendered as free from bacteria as possible, the danger from pneumonia following anesthesia is greatly diminished. With proper preparation, pneumonia seldom occurs.

The patient should receive a full bath, special attention being given to the hair. If the patient be a woman, the hair should be parted and braided in two braids, and the braids pinned around the head. A cap should then be put on the head, covering all the hair, effectually keeping it out of the way of both the operator and the anesthetist.

The After-care of Ether Patients.—During anesthesia the patient loses considerable body heat, consequently the bed should be well warmed. This is best done by using three stone heaters, which should be filled with water at a temperature of 125° F., covered with flannel covers, and put in the center of the bed. When the patient is returned, the heaters may be removed, or put outside *of at least one blanket* and away from the

body, so that there will be no possibility of burning. This is necessary, as burns result much more easily than under normal conditions.

The patient must be placed in bed in a comfortable position, preferably on the side, with the head straight, resting well on the cheek, as a greatly flexed or extended head obstructs the breathing and, being on the side, allows mucus and vomited material to drain from the mouth.

A kidney basin, small pieces of gauze, and ether towels should be close by the bed.

In using pieces of gauze to wipe out the mouth they should be first moistened in cold water.

Careful watching is necessary to avoid choking or injury, which may result from extreme restlessness during a semiconscious state.

THE ETHER BED.

Considerable care should be exercised in the preparation of a bed for an ether patient. Fresh linen must always be used. Over the draw sheet a blanket should be placed, which should be tucked in at the sides; a rubber sheet, covered with a draw sheet at the head of the bed, should be so arranged that it will come down under the shoulders when the patient is in bed.

A pillow should not be placed under the head but pinned to the bed frame, so that it stands up, making it impossible for the head to be pushed through the bars at the head of the bed.

A second blanket should be used to come next the patient, then the remainder of the bedclothing. This is to be tucked in at one side and folded back to the edge of the bed. The extra blanket covers the heaters, which are in the center of the bed.

When a pillow is used, it should be a thin one, protected by a rubber pillow-case.

CHAPTER XX.

SURGICAL TECHNIC.

The Operating Room—The Cleaning and Care—Sterilization of Dressings, Instruments and Utensils—Disinfecting the Hands—The Field of Operation—The Operating-room Nurse—The Patient—Postoperative Care—Complications.

TECHNIC means the most correct methods of procedure employed in the carrying out of any piece of work which requires *special knowledge and skill.*

Error in technic is a departure from the recognized procedure with resulting decrease in efficiency and failure to attain the desired result.

Surgical technic covers every surgical procedure from the most simple (as giving a hypodermic) to the most difficult and extensive surgical operations.

Surgical errors may result in prolonged illness, or even loss of life, when otherwise the patient may have had every chance for a good recovery. "Sterilization" means the absolute destruction of all single-cell organisms. No material is sterile while it contains living organisms, either upon its surface or within its substance.

The most efficient method of sterilization is by heat, and should be employed whenever possible. Steam under 15 pounds' pressure (120° C.) is effective in one-

half hour; live steam in one hour: boiling ten minutes. Any material that has been sterilized which afterward comes *into momentary contact with an unsterile object ceases to be sterile.*

"Disinfection" is the term used to indicate either the destruction of or rendering inert any infectious organisms.

"Antiseptic" is used in much the same way, but usually refers to the effect upon bacteria in septic wounds.

While wounds may become infected in several ways (by the air, or through the blood stream), experience shows that almost the only cause for wound infection is the *conveying of bacteria by contact*, or *by the implantation into a wound of some germ-bearing material.*

Prevention of wound infection requires that everything which comes in contact with a wounded surface must be rendered entirely free from living single-celled organisms.

Since we cannot sterilize the hands, nor the skin of a patient in the field of operation, we must use the best means we possess in making the skin free from bacteria.

PREPARATION OF THE HANDS.

All methods include mechanical scrubbing with soap and water, and immersion in some antiseptic.

Brushes used for the preparation should first be boiled. The hands and arms should be scrubbed under hot running water for ten minutes, the nails and palmar surface of hands and fingers receiving particular

attention; then soak in some antiseptic solution for at least five minutes.

When any disinfectant solution injures the skin, making the hands rough, its use should be discontinued. An irritated skin is a greater danger than failure to use strong antiseptics. Hence a nurse in her effort to disinfect her own hands may commit her first *surgical error*.

The simpler methods of preparation are generally considered best. After scrubbing—alcohol 70 per cent. immersion is always safe (three to five minutes).

Bichloride of mercury 1 to 1000 is also considered effective (five minutes).

Potassium permanganate 1 to 1000 followed by a solution of oxalic acid 1 to 16 is another method constantly in use. Its disadvantage is that oxalic acid is very irritating and immersion in this solution should be followed by thoroughly rinsing in sterile water.

Gloves should always be worn and are usually put on dry. When this is done the hands should first be dried with a sterile towel and powdered with sterile talcum powder.

PREPARATION OF GLOVES.

Thoroughly rinse the gloves with cold water: then wash inside and out with hot water and soap, dry thoroughly and examine for puncture. Dust both sides to prevent sticking and turn down the wrist about two inches to form a cuff. (This makes it easier to pull on.) Wrap each glove in separate side of the

cover and fold toward the center.[1] Sterilize twenty minutes at 15 pounds' pressure.

To repair gloves: First test for punctures by inflating, then watch for the escape of air. Gloves may be perfectly air-tight by using small pieces of rubber, held in place with a rubber cement. They should be mended on the inside and should not be sterilized for twelve hours after the patch has been put on.

These gloves may be used for dressings and minor work, but it is best to use unmended ones for major operations.

TO PREPARE INSTRUMENTS FOR USE.

Blunt instruments may be rolled and tied in a towel and boiled in a solution of soda bicarbonate from 0.5 to 1 per cent. for a period of twenty minutes. Sharp instruments, scissors, knives, needles, etc., should be protected by being wound in absorbent cotton and put in a package by themselves and boiled for five minutes. The water should be boiling when instruments are put in.

After using, instruments should be rinsed very thoroughly in cold water, otherwise the blood or any discharge is very hard to remove. Then scrub on a board with turpentine and bon-ami. The turpentine removes any particle of rust; afterward rinse in hot water and dry with a soft towel.

[1] Glove cases are a convenience and may be made like a bill-fold, with two pockets which fold in the center. The gloves may be put in flat, the right and the left in corresponding pockets. The size should be marked on the outside.

Sharp instruments should again be wound with absorbent cotton before they are returned to the case.

Basins may be boiled or subjected to live steam for twenty minutes.

Rubber tubing or rubber dam should first be rinsed with cold water and scrubbed with soap and hot water, then boiled ready for use. If it is to be kept sterile for any time it may be stored in a solution of formalin in a glass jar. In this case, it should be thoroughly rinsed in saline solution before using.

Gauze and material used for dressings, to be kept in the wards, should be prepared according to their intended uses. It is best to have each dressing in a separate cover; the package should contain everything necessary, from the small sponges to clean the wound to the outside dressing. The articles should be so arranged that when the package is opened the first needed should be on top.

THE OPERATING-ROOM NURSE.

The operating-room nurse must be a competent general nurse, as she will be called upon to perform one of the most responsible and important functions of her profession; hence, she should possess intelligence and good judgment in no ordinary degree. A good memory is indispensable. She should be punctual, reliable and sure of herself; hesitation or uncertainty may prove disastrous. Prompt action is always demanded.

She should possess a practical working knowledge of bacteriology. Her preparation of dressings, suture

material, instruments, utensils and appliances, also the general care of the operating-room should be based upon this knowledge.

Unless the room in which operations are performed is absolutely clean infection must result. As dust is one of the great dangers, means should be taken to prevent its entrance as much as possible. Windows should be dust-tight, and those in adjoining rooms kept closed. Ventilators and warm-air flues should be screened with canton flannel, the rough side toward the inlet; this will collect the finest particles of dust and they should be changed frequently. Radiators where they must be used should also be covered. A sheet may be pinned over and around this when the room is prepared for an operation.

Frequent and thorough washing of the walls and daily scrubbing of the floor is essential. *One should depend upon mechanical scrubbing as the first and most important part of surgical cleanliness.*

It is well to keep this in mind in caring for all operating-room equipment.

The Preparation of Suture Material.—Some of the more simple and satisfactory ways of preparing catgut are:

Cut in desired length (about 18 inches). Coil around the finger and fasten the end so that it will not loosen during sterilization. This should be put in a jar and covered with Park's solution:

Mercuric chloride		gr. xv
Tartaric acid		gr. lxxv
Ether		
Columbian spirits	āā	Oj

Soak in this solution (the length of time depends upon the size of the material).

No. 0	should	remain in	4	hours
No. 1	"	"	6	"
No. 2	"	"	8	"
No. 3	"	"	12	"
No. 4	"	"	18	"
No. 5	"	"	20	"

Pour off the Park's solution and store in Columbian spirits in a tightly covered jar until needed.

Chromicized Catgut ("forty day").—Cut in desired length and coil over the fingers as in plain catgut.

Place in an air-tight jar and cover the material with 95 per cent. alcohol; allow it to stand twenty-four hours.

Dry in the open air for twelve hours.

Place in chromic solution[1] (the length of time varies according to size).

Numbers 1 and 2 to remain in forty-eight hours.

Numbers 3 and 4 to remain in six days.

Dry for forty-eight hours in open air.

Place in 1 to 500 solution of mercuric chloride made of 95 per cent. alcohol for eight days.

Store in 95 per cent. alcohol and soak in a water-bath ten minutes before using.

Iodized Catgut.—Roll over fingers or on glass reels.

Drop these into a 15 per cent. solution of iodine *in ether.* Allow to remain seven days.

[1] Chromic solution:

Bichromate of potassium	grs. lxxx
Carbolic ac. sol. (5 per cent.)	O v

Remove and rinse in ether to remove excess of iodine.

Place in sterile air-tight jars to be removed as needed.

Silk Woven Gut.—Boil five minutes.

Remove and store in Columbian spirits or 1 to 40 solution of carbolic acid.

Preparation of Silk and Thread Sutures and Ligatures.—Silk and thread sutures or ligatures may be placed in a towel and sterilized at 15 pounds' pressure.

Kangaroo tendon may be sterilized in the same manner as catgut but does not stand high temperatures as well.

Formulæ for Saline Solutions.—1. *Physiological salt solution:*

Sodium chloride	9 gm.
Distilled water to	1000 c.c.

This should be brought to a boiling-point and kept at that degree thirty minutes, after cooling should be filtered, put in the flask and sterilized.

2. *Ringer's solution:*

Sod. chloride	9.00 gm.
Potassium chloride	0.20 gm.
Sodium bicarb.	0.20 gm.
Distilled water to	1000.00 c.c.

Treated as above described. The first is the usual "saline," the second is an attempt to more closely approximate the true blood serum.

THE PATIENT.

It must be remembered that one loses considerable heat during an operation, not only through exposure of the field of operation but by shock, be it ever so slight; consequently he should be sufficiently covered with light, warm blankets. Small blankets may be made to cover the chest and arms ¾ yard wide, 1¼ yards long; they may be sterilized and used as a routine in abdominal operations. They have the advantage of being light and can do no harm when they get very near the field of operation. If necessary, use hot-water bottles protected with blanket covers to keep the body warm.

Do not depend upon the temperature of the room to keep the patient warm.

The position of the patient upon the table depends upon the operation to be performed.

The arms of a patient must never be allowed to slip down and hang over the edge of the table; acute neuritis may be the result of this carelessness.

A very comfortable and safe way of securing the arms is to fold a blanket and lay it across the upper part of the table. The patient is put on this, the ends brought up between the body and the arms, then over the arms and the ends smoothly tucked under the back.

Final preparation depends upon the nature of the operation. The disinfectants used vary from 1 to 1000 bichloride of mercury to 2 per cent. iodine followed by 70 per cent. alcohol.

For rectal or vaginal operations green soap and water

followed by 1 to 1000 bichloride of mercury may safely be used. This should be thoroughly rinsed out with sterile water.

In emergency the preparation consists of shaving, washing with alcohol 70 per cent. for five minutes, then with ether, two minutes; when the skin is dry, paint with 7 per cent. iodine.

THE REACTION OF FEAR TO SURGICAL SHOCK.

Dr. George Crile has demonstrated the relation of fear and extreme exhaustion to shock due to severe physical injury.

The phenomena are the same.

The conditions attendant upon extreme fright, *i. e.*, fear, are: rapid heart, increased respirations, pallor of skin, sweating, dilatation of the pupils, a sensation of weakness (commonly described as a sinking feeling), and disturbance of the digestive function.

Muscular exertion carried to the point of extreme exhaustion gives rise to the same conditions as fear at its highest intensity.

The symptoms of "shock" resulting from severe physical injury are the same in all essentials, differing only in slight or minor detail.

One cannot always tell at first glance whether a man is badly hurt, badly scared or exhausted from overexertion.

"The attitude of the persons in whose hands the patient has committed himself in the face of a trying ordeal will make the strongest impression upon his

mind in the way of encouragement and reassurance." It is not sympathy alone, nor a friendly, personal interest and attention to matters pertaining to his comfort and well-being which make a very strong appeal to one, but the thing one wishes most to see is the keen attention to every detail of the situation and a serene confidence in the ability to meet any emergency that can possibly arise.

"The impressions the patient should receive are—that the group of workers are highly trained, familiar with every detail of the situation, keenly interested, and alert to their several duties. That the whole purpose of this alertly attentive body of workers is to bring the patient's own case to a successful conclusion."

The other impression the patient should not fail to receive is of the absolute certainty in the minds of every member of the hospital team that in this particular case they are going to win.

The nurse can do much to allay the fear of a patient. She should *not talk too much* and volunteer nothing about operative risks.

Overanxiety in insisting upon the absence of danger may have the opposite effect from that intended. Optimistic assurances of the nurse carry little weight; still she need not hesitate, when questioned, to express her confidence that the result will be good. Possibly the most difficult part will be to maintain a proper reticence without veering from the strict path of sincerity and truth. To deceive a patient is neither right nor fair nor in any way justifiable. If a patient suspects he is being deceived or that important matters

are being withheld confidence is lost which is most difficult to regain.

Sympathy, rightly understood, is of value and importance. "To be effective and helpful is *not emotional* but *intellectual;*" its office is to understand, not to commiserate; its purpose is to bring the person who is its object, by a clearer knowledge, to a viewpoint corresponding to our own. If the object aimed at is attained the effect upon the patient's mind will be to share our own feeling of confidence.

The Condition of the Patient.—Following an operation the patient is more or less depressed, or in a condition of shock of varying degree. Anesthesia plays an important part in this condition as it is increased or diminished according to the length of time the patient has been anesthetized.

Considerable heat has been lost and an abnormally small amount is being produced as a result of diminished oxidation.

There is also complete muscular relaxation, the muscles of the heart, bloodvessels, stomach and intestines as well as the voluntary muscles. As the result, there will be poor heart action, cold skin, inability of the stomach to retain anything taken into it, loss of peristalsis, which is increased and prolonged if there has been much manipulation or exposure of the intestines during the operation. This results in the accumulation of gas often becoming a distressing condition.

There is likely to be considerable irritation of the membranes of the respiratory tract; the kidneys in their effort to excrete unusual substances, plus the

effect of the drug and the depletion of fluids become irritated; this condition may become a serious complication.

The depletion of fluids is due to the small amount taken and the purging necessary in the general preparation.

This group of symptoms added to the presence of the wound and the condition which made this wound necessary, determines the seriousness of the patient's condition.

The treatment following an operation is to counteract the effect of conditions arising as a result of the operation and to prevent complications if possible. The first of importance is that the patient should never be left alone until consciousness is restored.

THE CARE OF POSTOPERATIVE CASES.

First the bed must be thoroughly warmed and the patient put between blankets. If an abdominal operation, placed on the back with the head turned to the side. The head greatly flexed or extended interferes with respiration. A roll, knee-rest or pillow should be put under the knees, which affords considerable degree of comfort after consciousness is established and should be done during the unconscious period, when the patient will not be disturbed.

When the nature of the operation permits, patient may be placed upon the side; in operations of the nose and throat, always on the side with the head turned well on the cheek. The knees should in such a case

be flexed, as it prevents the patient from rolling on to his face.

There should be absolute quiet in the room. Preparations for any expected emergency should be made before the patient is returned to the room that any treatment may be carried out as quickly and efficiently as possible.

Hypodermoclysis or proctoclysis may be given before the patient leaves the operating table if the condition is poor. Otherwise it may be necessary to carry out this treatment after patient is in bed. Hypodermic tray with the usual stimulants should always be at hand.

The patient should be kept quiet, that there may be no strain upon the wound or stitches.

Thirst is present always and causes considerable discomfort. If there is nausea and vomiting it is hard to allay, because fluids will not be retained. Then a saline enema is the method most frequently used. Otherwise ice in very small amounts or hot water by teaspoon may be given.

Washing the mouth frequently and keeping the lips moist is important in relieving the condition. If vomiting persists lavage may be necessary.

Retention of urine may be due to nervousness, or the nature of the operation may have been such that the parts are injured or swollen. It is most important that urine should be voided because of the unusual substances which must be thrown out of the body. Catheterization may be necessary and the urine whether catheterized or voided should be measured (for at least forty-eight hours) and a specimen sent for urinalysis.

When conditions permit and the patient can retain it, nourishing food should be given as soon as possible. If nausea is present only liquids and predigested foods should be allowed. If there is some particular thing the patient likes it is often retained better than a much more easily digested food he does not like.

COMPLICATIONS FOLLOWING OPERATIONS.

Complications which may follow operations are:

First, shock, which may occur during the operation or several hours after, is usually prepared for before the patient returns to his room, by having the bed warm; hypodermic tray with any stimulant which may be needed; apparatus for hypodermoclysis or proctoclysis, with normal saline at body temperature ready in an adjoining room or dressing-room; oxygen tank.

External heat is always indicated. Heaters should be placed in heavy covers and *used to warm the bed, not to come in contact with the patient* who will burn very easily in this condition. With everything at hand treatment can be carried out without loss of time.

Delayed shock may occur usually after patient has regained consciousness after the stimulating effect of the ether has passed off. It is not so profound as the primary shock and is most likely to manifest itself when the patient has shown very slight symptoms directly following the operation. One should not feel that a patient is safe from shock for at least eight hours following the operation, consequently should

be carefully watched during this time, even though seemingly recovered from the anesthetic.

The tongue, because of the relaxed condition of the muscles of the body, may slip back and obstruct respiration. (This is more likely to occur during the administration of the anesthetic but often happens afterward.) The condition should be watched for, and is evidenced by the blue color of the skin and the absence of respiration, the patient making a "choking sound" in the effort to get air.

The tongue should be seized and brought forward, and the jaw lifted upward and forward to prevent its recurrence.

Hemorrhage.—Hemorrhage is one of the most serious, and fortunately a rather infrequent complication. It may occur during the operation, immediately following (primary hemorrhage) or after a number of hours or days (secondary hemorrhage). The causes are either failure to ligate some vessel, the slipping of a ligature which has been tied, or bleeding from the capillaries of a denuded surface.

Symptoms.—The symptoms come on suddenly or gradually, according to the size of the vessel involved, and the interference of the flow of blood by the surrounding tissues.

In the more gradual, there is a steady increase in the pulse-rate with a corresponding decrease in volume, often becoming irregular or intermittent. The respiration is rapid, shallow and sighing. Temperature falls, there is pallor, restlessness, thirst, air hunger, and sometimes fear of approaching death.

When the vessel is large the succeeding stages have passed so rapidly that death may occur before help can be summoned.

The symptoms described which may occur in an internal, concealed hemorrhage, might follow an abdominal operation.

The nurse can *do* nothing. Her duty is none the less important, for she must be alert and watchful of any change which might indicate bleeding. *The early detection of these signs is most important, for upon this depends the life of the patient.*

Treatment.—The treatment is to limit the supply to the bleeding vessels as much as possible by elevating the part. If abdominal or intestinal, elevate the foot of the bed; this also serves to keep the blood circulating in the brain where it is most needed. Patient should be kept quiet. For this morphine is often ordered. The subsequent treatment depends upon the extent of the bleeding. Heart stimulants or anything which might increase the blood-pressure are contra-indicated until the hemorrhage has been controlled.

Then stimulants, hypodermoclysis or intravenous to supply body fluids (direction for the preparation described in another chapter), and possibly direct blood transfusion as a last resort.

If hemorrhage is from the surface of the body, limbs or scalp, the part should be elevated and pressure applied, either direct or along the course of the vessel; a ligature is the safest method. Ice, hot sponges, or towels, and styptics have been used. (The use of styptics is not safe from an aseptic standpoint, though for minor injuries some are still in use.)

Acute Dilatation of the Stomach.—This may occur suddenly, is always alarming and a dangerous complication. Large quantities of fluid are vomited greatly in excess of the amount taken. There are frequent eructations of gas and collapse is an early symptom.

The temperature may not be elevated or only slightly so. The pulse is weak, respirations increased, often dyspnea. Distention is present and persistent: the lower border of the stomach may reach the level of the umbilicus. No peristalsis can be detected. Death usually results.

Pneumonia.—The predisposing causes are lowered resistance from any cause, undue exposure before, during or after the operation. The exciting causes are bacteria, and more rarely the inspiration of foreign materials.

Symptoms.—Pain in the chest, the chill and initial rise of temperature, increase of pulse-rate with a disproportionate increase of respiration; the cough and characteristic sputum do not differ from the ordinary types of lobar pneumonia, the recovery by crisis is the same. The onset may be confused by the other conditions following the operation.

In bronchopneumonia the course of the disease is much less characteristic, the symptoms being very indefinite.

Retention of Urine.—This is very frequent and usually of slight importance following anesthesia. In retention with an overflow, there is a most complete retention while the dribbling of urine gives the false impression of incontinence. At the same time a dress-

ing may completely cover the suprapubic area if it has been an abdominal operation and it is difficult to determine the overdistended bladder.

Where there is a possibility of such a condition, all doubt should be removed by the passing of a catheter.

Suppression of Urine.—This is not a frequent complication of operations, but when it occurs is a most serious one. Failure of the patient to void within twelve hours following an operation should be catheterized to determine whether there is retention or suppression.

If suppression immediate treatment is essential, often to the life of the patient.

Careful charting of all symptoms is most necessary. The temperature, pulse, and respiration so that any marked deviation from their normal ratio may be noted: the absence or presence of nausea and vomiting or hiccough; the absence or presence of a bowel movement, the character and the fact that gas has or has not been passed; the voiding or retention of urine; if voided, whether voluntary or involuntary: the presence of cough and pain. Pain is a matter of great importance: character and location should be noted.

Infections (as the name implies) are due to the presence of bacteria. They may be local or general.

The simplest of the local infections is a stitch abscess, and next a mild wound infection which varies in degree but in general they are not serious.

Symptoms appear from the third to the seventh day. There are elevation of temperature, local pain and tenderness, headache and general discomfort.

Peritonitis.—The symptoms appear in from twenty-four to forty-eight hours following the operation. The onset is gradual. At first there is localized pain which afterward becomes general throughout the abdomen. This is intense in character; the patient usually lies with the thighs flexed on the body in the effort to relieve the tension of the abdominal muscles. There may be rigidity of these muscles. Later there are extreme tenderness and distention. There are very rapid pulse, high temperature and shallow frequent respirations. Early and persistent vomiting which may in the later stages become fecal in character; there may be diarrhea or constipation; the latter is the more frequent. Hiccough is a common and persistent symptom.

In the rapidly fatal cases there may be little rise in temperature, but profound depression from the first followed by collapse.

Septicemia.—The result of bacteria and their toxins in the blood. Symptoms may develop in a few hours or in several days. There is usually the initial chill with high temperature (the fever is of the remittent type), the pulse is rapid and small, respirations increased and shallow. The other symptoms are common to all infections, headache, nausea, vomiting, scanty, high-colored urine, possibly diarrhea.

Intestinal Obstruction.—This is usually caused by adhesions, and may develop at almost any time following an operation, particularly if there has been extensive inflammation. The time varies from a few days to months.

The signs of the more acute forms are: Distention, pain, nausea, vomiting which is distressing and persistent, often containing fecal matter. There is increase in pulse-rate and respiration often accompanied by subnormal temperature. There is the inability to move the bowels by enemata and early collapse, unless the condition is relieved by surgical measures.

CHAPTER XXI.

ASPIRATIONS.

Aspiration—Paracentesis—Lumbar Puncture — Hypodermoclysis and Intravenous Blood Transfusion—Preparation and Method of Giving.

ASPIRATION is withdrawing fluid from the body cavities by means of an aspirator.

Hydrothorax.—A collection of fluid in the pleural cavity is usually the result of pleurisy; it sometimes accompanies or follows pneumonia, and may occur during the early stage of tuberculosis.

To remove this fluid an aspirator is used, which consists of a large bottle to which is attached two tubes; on the end of one is the aspirating needle, on the other an exhaust pump, by which a vacuum is formed in the bottle. The needle is then inserted into the pleural cavity and the fluid withdrawn. The use of this apparatus prevents the entrace of air into the cavity.

The puncture is made through the posterior chest wall. When possible the patient should be allowed to sit up in bed, with the body and shoulders well forward; otherwise he may lie on the side.

The preparation consists of shaving and thoroughly scrubbing the part with green soap and water, then

with alcohol or any disinfectant desired. The area should be protected with sterile gauze or a towel.

Articles needed:

1 blanket to cover the patient's shoulders.

1 dressing sheet.

1 tube of ethyl chloride.

1 culture tube.

1 finger bowl with green soap and water.

1 finger bowl with alcohol or some disinfectant solution.

1 kidney basin.

1 bottle collodion with camel's-hair brush.

Sterile sponges.

Sterile cotton for collodion dressing.

Aspirating needles sterilized, covered and brought to the bedside on a tray in the vessel in which they were boiled; they are not to be uncovered until used.

It is best in all cases to prepare an emergency tray upon which should be a hypodermic syringe with needles sterilized and ready for use, and stimulants of various kinds, which are chosen according to individual needs.

Ascites.—A collection of fluid in the abdominal cavity may be caused by disease of the heart, liver, or kidneys; it may occur in tuberculous conditions. Cirrhosis of the liver is one of the most frequent causes. Whatever the cause, it results in obstruction to the circulation and the transudation of the fluid portion of the blood, which collects in the body cavities. To remove this fluid a cannula and trocar are generally

used; occasionally a small incision is made before the cannula is inserted.

The patient is most comfortable sitting up and the drainage is much better. The legs should be warmly covered and the back well supported.

The preparation is the same as for aspiration of the thorax, and in addition is needed:

1 scalpel (if incision is made).

1 pair of scissors (if incision is made).

Suture (if incision is made).

Sterile gauze.

Sponges.

Swathe.

Occasionally the wound is not sutured but left to drain. In such cases a tight swathe is of value.

In all cases there should be:

1 cannula and trocar.

Rubber tubing.

1 slop-jar to contain the fluid.

The tubing may be attached to the cannula and arranged to drain into the slop jar, which should be on the floor beside the bed.

Aspiration of the Pericardium.—This operation becomes necessary when there is a collection of fluid in this cavity, usually due to inflammation of the membrane itself. The preparation and procedure are the same as for aspiration of the thorax. The operation is accompanied by great danger and is seldom practised.

LUMBAR PUNCTURE.

A puncture into the lumbar region of the spinal canal to withdraw fluid which is the result of an inflammatory process of the membranes of the brain or spinal cord. The patient should lie on the side with the body bent well forward.

The preparation and procedure are the same as described above. The puncture is usually made with an aspirating needle or a specially designed trocar and cannula.

Any of these operations may be followed more or less by shock. In all cases it is well to prepare for emergency by having at hand a tray, which contains a hypodermic syringe and various stimulants.

HYPODERMOCLYSIS.

Hypodermoclysis is the forcing of large amounts of fluid into the cellular tissue to replace fluids lost (usually loss of blood).

It consists of normal salt solution, and varies in amount from one pint to two quarts. This is generally given under the breast (subpectorally), but it may be given in the soft tissues of the abdomen or below the shoulder-blade.

In postpartum hemorrhage the manipulation of the breast, necessary in giving "subpectoral saline," frequently results in mastitis later, which causes much discomfort. Not infrequently abscesses have occurred.

Preparation.—Saline at body temperature may be heated and kept at this degree by standing the flask in a pail of water, which is tested by a thermometer.

2 aspirating needles.

Rubber tubing (2 short pieces and 1 long piece).

Y-iglass connecting tube, all of which should be sterilized and brought to the bedside covered.

When advisable to give more slowly, only one needle need be used.

The surface should be prepared as for any minor surgical procedure and the puncture may be covered with a collodion dressing.

The flasks used for saline in hospitals are provided with rubber stoppers, through which are inserted two glass tubes; when in use one serves as a vent; to the other is fastened the rubber tubing with the needle attached; the flask is then inverted.

The solution should flow freely through the needle when it is inserted into the tissues. This excludes the possibility of introducing air.

Intravenous.—In an intravenous the fluid enters directly into the circulation. This method of introducing fluid into the body is accompanied by a certain amount of danger, and is used only in case of grave emergency.

One of the veins of the forearm is usually chosen because of its nearness to the surface. The area is prepared as for minor surgical operations.

Articles needed are:

Saline—body temperature.

Tubing.

Curved dropper.

1 scalpel.
2 rat-tooth forceps.
1 pair of scissors, curved, flat.
1 aneurysm needle or spear.
Ligatures.
Sutures.
Sponges.
Gauze dressing.
Bandage.

A curved dropper is used in the end of the tubing instead of a needle.

A local anesthetic may or may not be used. When the condition warrants such a procedure, but little pain is felt.

BLOOD TRANSFUSION.

The operation is performed only in extreme cases. The blood is taken from one person and transfused directly into the vein of another. This is a comparatively safe procedure when performed with the Kimpton tubes.

Articles needed:
A scalpel.
Hemostats.
Rat-tooth forceps.
Carrier.
Suture material, silk and silkworm-gut.
Sponges, gauze.
Bandage.

A local anesthetic is used for the donor.

Both patients should be watched carefully and made as comfortable as possible.

CHAPTER XXII.

FOOD AND FOOD VALUES.

Classification of Foods—Values—Special Diets—Infant Feeding—Forced Feeding.

Food is any substance which when taken into the body is capable of supplying heat or energy, of building up the body, or repairing waste.

Every movement of our bodies requires energy, which means that a certain amount of heat must be supplied.

In a locomotive, energy comes from oxidation of the fuel with which it is supplied. In the body, *food serves as fuel;* first becoming, through a process of chemical changes, a part of the body.

Not all the food taken into the body is converted into tissues or heat, or used up as energy. Some is stored up usually in the form of fat, in the subcutaneous tissues, or as glycogen in the liver.

The nutritive value of any foodstuff is measured by the heat, set free during its transformation into those products in which it is to leave the body. The unit of this measure is the calorie.

A calorie represents that amount of heat necessary to raise one kilogram of water 1° C. This in mechanical force is equal to 1.54 foot tons or sufficient energy to raise 1 ton 1.54 feet.

In the Centigrade scale 0° is freezing-point, 100° boiling-point. Therefore, to raise 1 kilogram of water

at 0° C. (freezing-point) to 100° C. (boiling-point) would require heat equal to 100 calories.

The necessary amount of food varies according to age, weight, sex, and activity of the individual. The proper choice of food depends upon the knowledge of food principles and the amount of energy they yield.

The value of different principles when oxidized in the body is approximately:

Organic Foods.—1 gram of protein yields 4 calories.

1 gram of carbohydrate yields 4 calories.

1 gram of fat yields 9 calories.

Inorganic Foods.—*Water* is an inorganic food and has no caloric value, but is absolutely indispensable, because it holds the products of digestion in solution, forms the principal part of the blood stream, is the channel through which waste is thrown off and makes up about 70 per cent. of the body weight.

Salts also have no caloric value and are equally indispensable. They are an essential part of all tissues and enter largely into the composition of bone, teeth, and cartilage. They help in regulating the flow of fluids to and from tissues: they maintain the normal reaction of body fluids and furnish material for the acidity or alkalinity of digestive fluids and other secretions: they are also necessary for proper clotting of the blood.

Fat can replace carbohydrates. Protein can replace fat or carbohydrates, and be partly replaced by them; but that which represents the amount necessary to replace that lost by the breaking down of tissues *cannot* be replaced.

If fat is combined with protein and carbohydrates,

less than one-half the quantity of protein is necessary to repair body waste.

It has been estimated that a man weighing 70 kilograms (154 pounds), to perform moderate work would require 40 calories per kilo. of weight for twenty-four hours, or $70 \times 40 = 2800$ calories, sufficient heat to bring 28 kilograms of ice to the boiling-point; for laborious work he would require 60 calories per kilo, or $70 \times 60 = 4200$ calories. At rest he would require 30 calories, or $70 \times 30 = 2100$ calories.

A mixed diet is always more completely absorbed and more palatable. Of protein about 80 per cent. is absorbed, fats almost completely, and carbohydrate completely. Foods which have a small amount of residue are desirable, as it stimulates peristalsis, thereby regulating the bowel.

Among the important things to be remembered are the *regularity of meals; rest before and after; variety* and temperature of the food.

VALUE OF SOME OF THE STANDARD FOODS.

In 10 grams of	Protein, gm.	Fat, gm.	Carbohydrate.	Calories approximate.
Beef, mutton, fish, fowl	20.0	5 to 10	..	125 to 170
Ham	20.0	25	..	305
Bacon	12.0	50	..	500
1 egg (50 gms. without shell)	6.5	5	..	75
Milk	3.0	4	5	70
Cream (very thick)	3.0	40	3	385
Cream, good	3.0	20	3	200
Butter	1.0	85	..	780
Cheese	25.0	.33	2	400
Bread	9.0	1	60	275
Wheat flour	12.0	..	75	350
Oatmeal	16.0	7	66	390
Rice	8.0	..	80	350
Potato	2.0	..	20	90

From the above list a diet may be chosen for any condition where proteins or carbohydrates are not restricted.

A STRICT DIABETIC DIET.

Meat, poultry, game, fish, clear soups, gelatin, eggs, butter, olive oil, tea, coffee, and for a variety, tongue, sweetbreads, tripe, kidneys, pigs' feet, brains, bone-marrow, anchovies, caviar, lobster, crabs, sardines, shrimp, smoked or pickled meat or fish.

TABLE I.—FOODS UNCONDITIONALLY ALLOWED. STRICT DIABETIC DIET. APPROXIMATE VALUES.

Foods and portions.	Carbo-hydrate.	Protein.	Fat.	Calories.
Bacon, 1 slice, 30 gms.	0	3.0	19.4	190
Beef:				
Roast (lean), 1 slice, 100 gms.	0	23.0	1.6	110
Roast (fat), 1 slice, 100 gms.	0	20.0	20.0	250
Scraped (4 in. portion), 100 gms.	0	21.0	10.5	180
Corned (canned), 1 slice, 50 gms.	0	13.0	9.3	140
Juice, ℥ iv (½ cup)	0	6.0	0.7	30
Brandy, ℥ j	0	0	0	85
Butter, 1 portion, 10 gms.	0	0	8.5	80
Cheese, 1 cube (American red)	0	4.0	5.5	70
Chicken (roast), 1 slice, 100 gms.	0	32.0	4.4	180
Coffee without sugar or cream	0	0	0	—
Egg (one)	0	6.6	6.0	80
Yolk (one)	0	5.0	2.5	55
Fish (fat) (salmon), 1 hp. tb. sp.	0	11.0	6.5	105
Lean (cod), 1 hp. tb. sp.	0	8.5	..	35
French dressing (olive oil, vinegar, etc., ʒ ij)	0	0	8.0	74
Gelatin, 1 hp. tb. sp.	0	4.5	0.05	188
Lamb chop (with bone), 100 gms.	0	14.7	9.5	150
Olive oil (1 teaspoonful)	0	0	4.0	38
Pork Chop (one)	0	17.2	4.2	110
Soup, clear, ℥ v	0	1.4	0	10.2
Steak (without fat), 1 slice, 100 gms.	0	27.6	7.7	185
Turkey (roast), 1 slice, 100 gms.	0	27.8	18.4	285
Tea (without sugar or cream)	0	0	0	—
Whisky, ℥ j	0	0	0	85

Bread and puddings of gluten flour or gelatin flavored with lemon and sweetened with saccharin. All kinds of natural or artificial carbonated water, with or without lemon and saccharin. Whisky, brandy, and light wines.

TABLE II.—DIABETIC DIET. ANY FOUR EQUAL IN CARBOHYDRATE VALUE TO ONE SLICE OF BREAD.

Foods and portions.	Carbohydrate.	Protein.	Fat.	Calories.
Beets, 2 hp. tb. sp.	4	1.5	..	25
Beans (string), 8 hp. tb. sp.	4	2.0	2.8	50
Cabbage, 8 hp. tb. sp.	4	4.8	0.8	40
Carrots, 3 hp. tb. sp.	4	0.5	0.2	18
Cream (20 per cent.), 8 hp. tb. sp., 4 oz.	4	4.0	24.0	240
Clams (6), six	4	4.5	0.4	47
Eggs:				
Scrambled, Omelet } 4 hp. tb. sp.	4	24.0	18.0	280
Lettuce, 2 hp. tb. sp.	4	1.5	0.5	50
Nuts (filberts), 30 nuts	4	4.5	19.5	215
Onions, cooked (one)	4	1.2	1.8	42
Oysters, (eight)	4	8.0	1.6	76
Soups, clear	—	—	—	—
Spinach, 3 hp. tb. sp.	4	3.0	6.0	85
Turnip, 8 hp. tb. sp.	4	2.0	3.0	24

It is usual to start with a diet practically carbohydrate free. If the sugar disappears from the urine, as it may in light cases, measured quantities of bread or other starchy food may be added, taking care not to give enough to cause sugar to appear.

Protein and fat must be given in sufficient quantities to make up the necessary food value. As these foods create acids in the body, acid poisoning must be watched for.

To lessen this danger "starvation days," or days when only green vegetables are allowed, are usually prescribed.

TABLE III.—DIABETIC DIET. ANY TWO EQUAL IN CARBOHYDRATE VALUE TO ONE SLICE OF BREAD.

Foods and portions.	Carbohydrate.	Protein.	Fat.	Calories.
Beans (butter beans), 2 hp. tb. sp.	8	3.2	0.2	60
Buttermilk, ℥v	8	4.5	.07	50
Fish chowder, 100 gms.	8	3.0	8.0	90
Hash (meat hash), 2 hp. tb. sp.	8	1.9	1.4	80
Macaroni, 2 hp. tb. sp.	8	2.0	1.0	50
Milk, ℥v, 2 hp. tb. sp.	8	4.5	5.9	100
Scallops (fried), 2 hp. tb. sp.	8	28.0	1.7	160
Squash, 2 hp. tb. sp.	8	1.5	0	60
Strawberries, 4 hp. tb. sp.	8	1.0	0.6	40
Tomatoes (one medium size)	8	2.4	4.0	46
Walnuts (14 nuts)	8	10.5	37.5	420

A liberal allowance of butter should be served with each meal. Vegetables should be seasoned with butter, though it should be as little obvious as possible. Olive oil may be used, either on salad or taken clear.

The above tables show the approximate carbohydrate value of various foods compared with that of one slice of *bakers' bread* cut ½ inch thick.

From this and the following table showing the percentage of carbohydrate found in many of the green vegetables a suitable diet of almost any carbohydrate value may be chosen.

TABLE IV.—DIABETIC DIET. ANY ONE EQUALS IN CARBOHYDRATE VALUE ONE SLICE OF BREAD.

Foods and portions.	Carbohydrate.	Protein.	Fat.	Calories.
Apple (one medium)	15	0.5	0.5	75
Apple sauce, 1 hp. tb. sp. . . .	15	—	0.5	70
Apricots (stewed), 1 hp. tb. sp. .	15	0.7	0.5	80
Banana (one medium size) . .	15	1.0	—	70
Beans:				
Baked, 2 hp. tb. sp.	15	7.5	8.0	150
Butter, 4 hp. tb. sp.	15	4.0	0.2	65
Lima, 2 hp. tb. sp.	15	64.0	0.5	130
Breakfast roll, ½ of (1) one . .	15	1.0	—	70
Buttermilk, ℥x	15	9.3	1.4	100
Cereal (dry):				
Cornflakes, etc., 4 tb. sp. . .	15	1.2	—	8.0
Coffee, 1 cup, ¼ cream, 2 cubes sugar	15	3.0	7.5	155
Chocolate (Baker's), 5 gms., 28 grs.	15	6.5	24.0	300
Crackers, 3 round or graham . .	15	1.5	1.5	90
Cream soup, ℥v	15	4.0	3.0	100
Custard, 2 hp. tb. sp.	15	6.0	1.0	100
Gruel with milk, 6 tb. sp., 200 gms.	15	4.0	4.0	100
Macaroni, 4 hp. tb. sp. . . .	15	4.0	4.0	100
Milk, ℥x	15	9.3	11.8	200
Muffin (one)	15	1.0	—	70
Orange (one medium size) . .	15	1.0	—	70
Pears (one medium size) . . .	15	1.5	5.0	75
Peaches, stewed, 1 hp. tb. sp. .	15	0.7	0.5	80
Potato:				
Baked (one medium size) . .	15	2.0	—	80
Mashed, 2 hp. tb. sp. . . .	15	2.0	2.0	85
Peas, green, 3 hp. tb. sp. . . .	15	7.5	3.0	120
Rice, 1 hp. tb. sp.	15	1.0	—	60
Tea, 1 cup, ¼ cream, 2 cubes sugar	15	3.0	7.5	155
Tea roll, one	15	1.0	—	77
Zweibach, 1 slice	15	3.0	3.0	120

From the above tables a diet of any given carbohydrate value may be chosen.

An actual record of the amount of fluid and carbohydrate intake and output should be kept.

A simple comprehensive chart should be used for this purpose.

PERCENTAGE OF CARBOHYDRATES.

5 per cent. or less.
- Lettuce
- Spinach
- Celery
- String beans
- Dandelion greens
- Tomatoes
- Rhubarb
- Swiss Chard
- Egg plant
- Cauliflower
- Asparagus
- Cucumbers
- Water cress
- Pickles (unsweetened and unspiced)
- Clams
- Ripe olives
- Butternuts
- Fish roe
- Sauerkraut

6 per cent. or less.
- Cabbage
- Oysters
- Radishes

10 per cent. or less.
- Onions
- Turnips
- Beets
- Oranges
- Blackberries
- Watermelons
- Brazil nuts
- Squash
- Carrots
- Mushrooms
- Strawberries
- Peaches
- Muskmelons
- Pecans
- Hickory nuts.

In nephritis the condition of the kidneys is the problem to be considered. The normal kidney excretes urea, water, and salts. In diseased conditions they are unable to do this; therefore in order not to throw work upon these organs, certain foods, the waste of which is eliminated by them, are restricted, namely, protein, salt, and water.

A milk diet is no longer considered the proper diet, because it contains such a large percentage of protein. In a quart there are about 35 grams. The three quarts necessary for one day would contain 105 grams of protein, which is in excess of the ordinary amount taken under normal conditions.

A small amount of milk, possibly a quart, is allowable. Cream and milk-sugar should be substituted to make up the balance, where a liquid diet is essential.

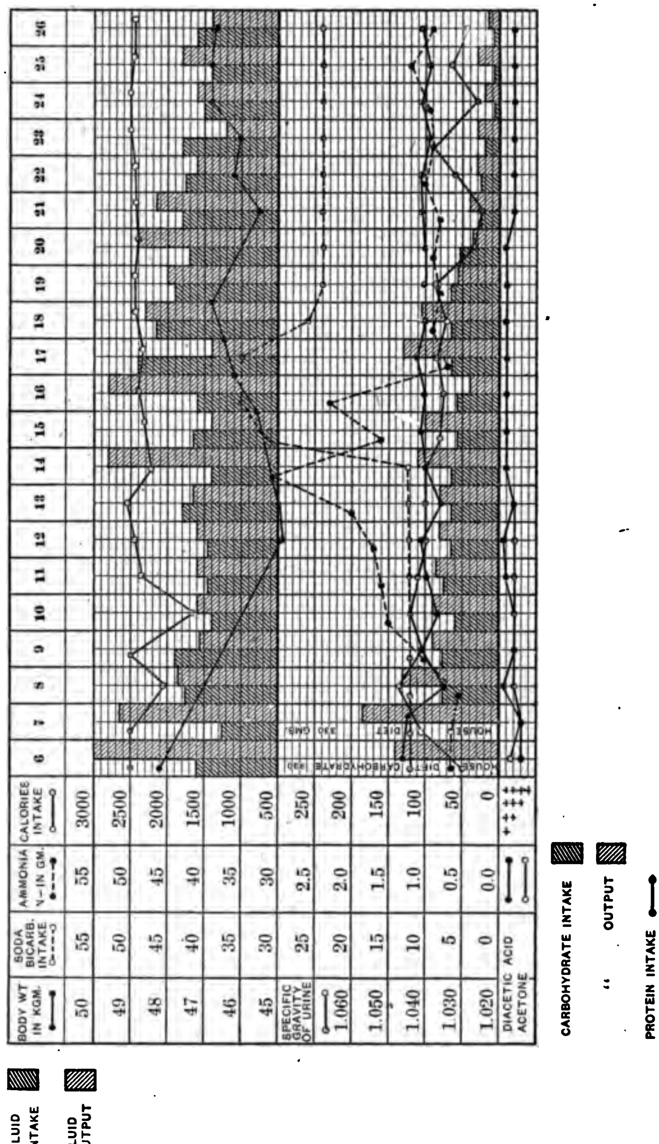

FIG. 39.—Metabolism chart.

In less acute conditions the white meat of chicken, fat ham or bacon, raw oysters, clams, and fresh fish, boiled or broiled, onions, cauliflower, mushrooms, lettuce, spinach, celery, cabbage, rice, tapioca, and ripe fruits should be given sparingly.

Alcoholic beverages and quantities of meat, eggs, peas, and beans should be especially avoided.

As salt is also excreted in the urine, it becomes necessary to regulate the amount of salt by giving a salt-free diet or one in which the amount has been carefully regulated. This is only a temporary measure, but is particularly necessary if the patient has ascites or edema. Salt, having an affinity for water, holds water in the body. By the omission of salt a patient may lose ten pounds (of fluid) per week.

Water, always necessary, must be taken in very limited amounts.

Gout is caused by an excess of uric acid in the body and the difficulty of its excretion. It is the waste of the nuclei in broken-down animal cells not only those of our own bodies, but of the meat which we eat, consequently the omission of meat diminishes the uric acid by one-half.

The protein may be supplied by eggs, milk, vegetables, and cheese. An excessive amount of fat and all forms of alcohol should be avoided. A fair amount of exercise should be taken daily.

In stomach trouble three things must be considered in choosing the diet: First, if there be too much or too little acid; secondly, if the stomach be irritable, and if the food leaves the stomach properly.

If there is too much acid, all foods which tend to stimulate the flow of gastric juice (acid secretion) should be omitted, such as beef tea, bouillon, clear soups, and highly seasoned food. Albuminous food, preferably eggs, should be substituted, as the albumen in the egg unites with the acid and renders it harmless. Fatty articles, as cream, butter, and olive oil, diminish the secretion.

The absence or diminution of acid may be remedied by giving those foods which stimulate the secretion of acid, as beef tea, clear soups, bouillon, and highly spiced and seasoned foods.

When the stomach becomes irritated upon taking an ordinary meal, a non-irritating diet should be chosen, which consists of (no alcohol) foods not highly seasoned and which disintegrate easily in the stomach; only a limited amount of salt should be partaken.

Cereals, bread (better toasted), eggs, macaroni, and simple puddings may be used in nearly all cases. In those less severe, white meat of chicken, beef, lamb (provided it is properly cooked and finely divided), rice, mashed potatoes, celery cooked soft, butter, cream, and a moderate amount of milk.

A cancer or ulcer may cause a partial obstruction, and the food will not leave the stomach promptly. Finely divided, concentrated food should be used. Fat should be given freely and starchy foods which leave little residue. Fluids should be restricted, as they are likely to distend the stomach. To make up for the loss of fluid in the body, an enema of normal salt solution may be given, which will allay the thirst.

Constipation, to a certain extent, may be relieved by regulating the diet and omitting all constipating foods, such as milk, eggs, cheese, white bread, also any food which leaves a large amount of residue. In the morning before breakfast a glass of water or an orange may be taken; honey also helps. At noon a simple salad, celery, cucumbers, lettuce, or chopped cabbage; cooked fruit, as a baked apple or a pear; stewed prunes, apricots, or ripe, raw fruit.

A mixed diet, with a variety of vegetables and always a large amount of water, is essential.

Diarrhea is caused by irritation of the intestines, brought about by some food (usually protein or fat), or by the presence of bacteria, possibly causing fermentation or decomposition of the intestinal contents.

The irritating food should be omitted. The surest method is to omit all food for forty-eight hours or more when possible. It is often necessary to keep up the nourishment. Such foods as milk and lime water, or milk with rice cooked very soft, tapioca, cornstarch, and a small amount of tea or coffee. After the acute stage, chicken or beef may be prescribed. A complete change of food often effects a cure.

In the various febrile diseases the diet must be regulated according to existing conditions, always keeping in mind the necessity for a certain amount of protein.

To prevent excessive waste, easily digested, non-irritating, concentrated food should be given, the main object being to afford as great a variety as possible.

The custom of giving milk only to fever patients, under general conditions, is almost obsolete. While

milk contains all the elements necessary to sustain life, and has been termed a "perfect food," it also contains 87.6 per cent. of water and leaves considerable residue.

Patients are likely to become tired of it, though an occasional glass of milk is beneficial. It should not be given so often that the patient gets tired of it, as one may if it be given every few hours.

Cream may be substituted, in a measure, and is of high value as a food. It may be taken in oyster broth or clam broth. Two or three ounces flavored with weak tea or coffee, and one or two lumps of sugar, make a pleasant change; besides, the sugar affords considerable nourishment, as one lump is equal to the white of one egg in value.

Cocoa, beef, mutton, and chicken broth afford variety.

Eggs in the form of albumen water, egg-nog, or egg lemon or orangeade, and a soft dropped egg, custard, and ice-cream also may be used.

In certain conditions a half-ounce of olive oil may be given morning and night. It should be ice cold, and should be given with the medicines, so that it will not be overlooked.

Less severe conditions, soft solids, such as milk toast, cereals, tapioca, rice, junket, and gelatin flavored with fruit juice or wines may be allowed.

It has been found that typhoid patients who have been fed small amounts of concentrated food frequently and been given plenty of fresh, cold water to drink, have made a much shorter convalescence and are con-

siderably less emaciated than with the old method of feeding.

There are conditions when this method of feeding must be modified somewhat, but the rule to prevent excessive waste holds good.

In cases of nausea or vomiting it is best to omit all feeding by mouth and feed by the rectum, if necessary, thus allowing the stomach to rest and adjust itself.

A teaspoonful of iced champagne may then be given every two hours for a number of hours. If it is retained, toast water, albumen water, or buttermilk may be given by teaspoonfuls every four hours, gradually shortening the time and increasing the amount until a greater variety of food may be allowed.

FORCED FEEDING.

In feeding patients who are unable to swallow, as is sometimes the case in diphtheria, or hysterical patients who refuse food, it may be necessary to resort to forced feeding. The food usually consists of milk, eggs, beef juice, and sometimes brandy or whisky. It should be prepared in a pitcher and heated to 100° F.

A stomach or nasal tube should be boiled, connected with a glass funnel, and carried to the bedside on a tray with the pitcher, the whole neatly covered with a napkin.

A mouth gag is necessary if the stomach tube is used. The tube should be moistened and passed quickly into the stomach. Before pouring in the food sufficient time should elapse to be certain that the tube is in the

stomach, not in the air passages. The tube should be removed quickly to guard against regurgitation.

Infant Feeding and Artificial Food.—Many infants die yearly from improper feeding—not lack of food, but poor and particularly unclean food.

Some of the indications for artificial feeding are a diseased mother, poor quality or an insufficient amount of maternal milk, or by the separation of mother and child. This is possibly the most frequent reason for resorting to artificial food.

As a substitute for mother's milk it has been proved that cow's milk is the best, not as it is drawn from the cow, but so modified that in composition it is practically the same as maternal milk. In this age of pure food, dairy inspection, etc., it is possible to obtain fairly clean milk from a healthy herd, which is always better than that from a single cow.

The difference in composition is: Maternal milk, 3.8 to 4 per cent. fat, 6 per cent. sugar, 2 to 2.5 per cent. protein; cow's milk, 3.7 to 4 per cent. fat, 4.5 per cent. sugar, 4 per cent. protein. Maternal milk is alkaline; cow's milk is neutral or acid.

The manner of modifying milk is to separate it, then recombine it according to a specified formula.

The milk should be cooled at a temperature of about 40° F. and allowed to stand undisturbed for eight or ten hours for the cream to rise. The upper one-third will then be approximately 10 per cent. fat, or the upper one-half 7 per cent. fat. Either may be used.

The 10 per cent. fat is 3 per cent. fat to 1 per cent. protein.

The 7 per cent. fat is 2 per cent. fat to 1 per cent. protein.

The sugar—1 part of milk-sugar to 20 parts of the mixture, or 1 ounce to 20 ounces. Lime water, 1 part to 20 of mixture or 1 ounce to 20 ounces.

FORMULÆ FOR TWENTY OUNCES.

Milk-sugar, 1 oz. Lime water, 1 oz.	With 10% cream.		Fat.	Formulas. Sugar.	Protein.
Boiled water, q. s. ad 20 oz.	4 oz.	=	2.0%	6.0%	0.66%
" " q. s. ad 20 oz.	5 oz.	=	2.5%	6.0%	0.83%
" " q. s. ad 20 oz.	6 oz.	=	3.0%	6.0%	1.00%
" " q. s. ad 20 oz.	7 oz.	=	3.5%	6.5%	1.16%
" " q. s. ad 20 oz.	8 oz.	=	4.0%	7.0%	1.33%

Dissolve the milk-sugar in hot water, add sufficient 10 per cent. cream, lime water, and boiled water to make the desired amount.

Divide into portions necessary for each feeding and put in separate bottles. Close the mouth of the bottle with non-absorbent cotton and do not open until used.

To sterilize milk it must be brought to the boiling-point, which changes the nature of the food to such an extent that it is not considered good for babies—hence the custom of pasteurization.

Heat to 170° F. and keep at that temperature for twenty minutes, then cool rapidly on ice. About 99 per cent. of all bacteria are killed by this process, but the milk will not remain good for a great length of time, and ought to be used within forty-eight hours.

Rubber nipples should be boiled for each feeding, and not allowed to stand in a cup of water or any solution.

When the child appears to be hungry after the regular feeding, the *value*, NOT the *amount* should be increased, and the same quantity given.

CHAPTER XXIII.

FEVERS.

Classification and Significance — Types and Changes Brought About in the Body—Nursing in Diseases in which Fever is an Important Symptom.

Pyrexia or fever is understood to mean an abnormally high temperature. It is always a symptom, not a disease, and must be considered as one of a group of symptoms caused by some derangement of the chemistry of the body.

Causes may be generated from within, from failure to cast off waste products (urea); from certain changes in the blood (as in anemia); from exposure to extreme heat, as sunstroke; from mental abnormalities, as hysteria.

Most frequently fever is due to substances taken in: namely, bacteria or protozoa. In either case they act by affecting the nervous system, and the normal balance between heat production and heat elimination is lost. This is more often due to overproduction than to lack of radiation.

Classification.—*Continued Fever.*—The temperature may remain high, with only slight variation for a longer or shorter period. It may be for only a few hours, or it may last days or weeks. Typhoid is a typical continued fever.

Intermittent type is marked by periods when the temperature may fall to normal, and then rise again. Malaria is an example of this condition.

Remittent type is characterized by a temperature continually above the normal, which rises and falls, but without intermissions. The remissions between afternoon and morning temperature equal or exceed 2°. For example, tuberculosis.

Another classification which includes a group of accompanying conditions is:

The Sthenic Type.—Temperature high; skin hot and dry; pulse full, strong, rapid and of high tension; nervous system overstimulated with delirium which may become active or violent.

The Asthenic Type.—Temperature high; skin cold and clammy; pulse feeble; nervous system depressed.

In rare cases there is an inverse type, when the temperature is highest in the morning, the opposite of the general rule.

The return from a high degree of temperature to normal is known as the defervescence. If this return is gradual it is spoken of as lysis; if sudden, it is called crisis.

Recrudescence is the rise in temperature, lasting only a short time, after it has regained the normal.

When fever returns with all its accompanying symptoms a reinfection has taken place. It is generally known as relapse. The elevation of temperature, as a rule, is accompanied by certain symptoms referable to other organs and tissues.

Changes which Take Place in the Skin.—First, according to type, moist or dry. Second, the various eruptions associated with eruptive fevers.

Tiny vesicles (blisters) often appear in great numbers upon various parts of the body.

Delicate skins often show a general *rosy flush.* This is probably due to the increased quantity of blood in the cutaneous capillaries.

In the later stage desquamation may take place—*always* in the eruptive fevers.

Mucous Membranes.—Herpes, sometimes known as fever sores, may occur, particularly in pneumonia and malaria.

There are thirst and dryness of the mouth and tongue; the latter may be swollen, cracked, or have indentations made by the teeth. The teeth, tongue, and lips may have a deposit of sordes. (Sordes is an accumulation of mucus, the natural secretion of the mouth; discarded epithelial cells; blood, and a multitude of bacteria.)

The lips become fissured and the gums spongy and bleeding. The tongue becomes tremulous, and has a coating which varies from a white, furry coat to a dark brown crust.

The pharynx is at first dry, and may be the seat of a catarrhal inflammation; the tonsils may be swollen or ulcerated; the salivary glands tender or swollen.

The membranes of the eyes and nose are congested, and there is an increase of their watery secretion at first; later they become dry. Nose-bleed may occur, especially in typhoid.

Organs of Digestion.—The appetite is diminished or entirely absent.

At the onset nausea is common, and vomiting often follows:

Gas in the intestines causes little discomfort, *except in typhoid*, in which it frequently occurs, and is the result of partial paralysis of the muscular coat of the intestines, due to the general infection rather than by the presence and growth of bacteria.

Usually there is constipation, caused by depletion of fluids. Diarrhea may occur in rare cases; however, constipation is the general rule.

The Circulatory System.—The pulse in fever is generally one of increased force and frequency and of high tension. As a rule the increase is proportionate to the degree of temperature, though there are, of course, exceptions to this rule, according to individuals and the type of the disease.

In children the pulse is particularly prone to increase out of proportion to the rise in temperature, sometimes reaching 150 to 170 per minute.

A dicrotic or intermittent pulse or one irregular in force or rhythm denotes heart weakness. Any sudden increase in rapidity or weakness is likely to indicate the onset of some complication.

Position, emotional excitement, or any muscular effort influence the strength and rapidity of the pulse to a considerable degree.

Consequently the position should always be *a recumbent one*, for any saving of the heart's strength may be a considerable factor in the preservation of life if the disease be of long duration.

Respiratory System.—The number of respirations may be increased and the depth of breathing diminished even when there is no lung complication.

When pulmonary disease exists, the respirations may be rapid, irregular, and painful. In marked pulmonary disease the breathing may become difficult, or become almost impossible when the patient is lying flat in bed and it becomes necessary to have him sit up. A cough may exist, often with expectoration.

Urinary System.—The urine is lessened in quantity of high specific gravity; dark in color and possibly turbid. Upon standing it often throws down a reddish-brown sediment, consisting usually of uric acid or urates. It may cause a burning sensation on being voided, due to its increased acidity. In severe cases albumin, casts, and even blood may appear; these, however, do not mean a permanent impairment of the kidneys.

As the disease progresses toward recovery the amount increases and the urine becomes more normal in all respects. Retention of urine is rare in febrile diseases.

Nervous System.—Febrile diseases, particularly when the onset is rapid, usually are ushered in with a distinct chill; there may be marked shivering, pallor, blueness of lips, and chattering teeth, or there may be chilly feelings of greater or lesser severity.

In a child it is often a convulsion which may vary from slight muscular movements of the face and extremities to violent movements of the whole body.

Following this chill or convulsion the rise in temperature, accompanied by other symptoms, appears.

Secondary chills usually indicate some complication. Secondary convulsions are rare. When they do occur, they are usually due to hysteria or the presence of waste products which have not been eliminated by the kidneys. Urinalysis determines this.

Headache is one of the most frequent symptoms at the onset. It may vary from a dull ache to an intense, persistent, and almost unendurable pain. At times it is of the neuralgic type. The pain is usually in the forehead and temples, more rarely in the top and back of the head.

Pains in the back, limbs, and bones often accompany the headache. Dizziness exists, which is increased upon assuming an upright position.

Mental symptoms are common manifestations. They vary from a mere dulness and indisposition to mental exertion, to extremes of delirium, or absolute coma. These symptoms vary according to the temperament of the individual and type and severity of the disease.

Extremes of mental disorder usually manifest themselves when the disease is at its worst.

Delirium may be a mild type and appear only at night, or it may become so noisy and violent that restraint is necessary.

Habitual users of alcohol are especially liable, during pneumonia, to develop delirium tremens.

The sense of taste is perverted or wholly lost. Hearing may be impaired in typhoid, but more often it is abnormally acute; there may be ringing or other noises in the ears.

Infectious fevers may be complicated by middle-ear infections.

The secretions of the eyes at first increase, and later diminish, causing dryness. At times the lids may be gummed together. There is often dread of bright lights.

Fever is always accompanied by increased tissue waste and consequent emaciation, which is increased by the disinclination of the patient to take food and the inability on the part of the digestive and assimilative powers to supply the increased bodily nourishment.

Disease has been defined as "an active process depending essentially upon altered activities of some of the cells of the body, due to the presence of some abnormal stimuli." The cells are made to do, not new things, but too much or too little of the things they do normally, thus the harmonious action, as a whole, is interfered with.

There may be death of some and an active reproduction of others, interfering with nutrition, oxidation, secretion, excretion, etc.

Nutritional changes give rise to structural changes, or organic changes. Such diseases are called *organic diseases.*

When there is no tissue change but simply altered cell action it is spoken of as a *functional disease.*

A chronic disease is slow in development and long continued.

An acute disease is relatively short and severe. Many of the acute diseases are *self-limited,* run a definite course, after which recovery may be expected.

Constitutional diseases affect the whole system to a certain extent (rickets, gout, scurvy).

Communicable diseases may be transmitted by contact, by inoculation or by carriers, and are caused by the growth and multiplication of pathogenic organisms in the body.

Diseases are said to be epidemic when a large number of persons in any locality are stricken with the same disease.

An acute communicable disease (so-called contagious or infectious disease) is due to a specific organism, each particular organism producing special manifestations peculiar to itself.

These manifestations (signs and symptoms) are due to the action of the bacteria plus the active defense made by the body cells.

Some bacteria multiply in the body and their effect is due to their mechanical presence. Others produce a toxin or poison which is added to the effect of the bacteria themselves.

Diphtheria organisms (Klebs-Loeffler bacilli) may colonize upon a mucous surface and produce a soluble toxin which may be absorbed by the blood and carried all over the body, the organism not entering the blood stream.

In typhoid the bacterial cell circulates in the blood stream, the toxin remains within itself until the cell disintegrates, when the poison is set free.

The necessary precaution to prevent the spread of infection is isolation. This does not mean that each individual disease must be in a separate building or

room. A patient whose diagnosis is doubtful, as one suffering from an infectious disease other than that treated in the ward, may be treated as a separate unit, a unit being an area which represents a separate, distinct infection. This area may be only a single bed, or a whole room. A nurse caring for such a patient should wear a short-sleeved uniform, and over this a long gown when coming in contact with him. After caring for him, making the bed, feeding or touching him in any way, or coming in contact with anything touched by him, she should remove her gown, scrub her hands and forearms to the elbow with soap and water. Before going to another patient a different gown should be put on.

In this way a typhoid patient may be barred or kept apart from any others. Other patients must not be allowed to go near or touch anything which is used by, or comes in contact with, such a patient.

He should have a separate thermometer, separate dishes and utensils, which should be sterilized after using.

Fever is a symptom which occurs to a greater or lesser degree in the majority of diseases, probably due to the altered activity of the cells and derangement of the chemistry of the body. It is one of the prominent symptoms in infections, caused not only by the presence of the toxins but the resistance of the body cells in their effort to combat them.

In caring for fever patients the first consideration is the *cause* of the fever. If it is due to a transmissible disease, how the infection leaves the body, the length

of time the organisms may live outside the body, and the means by which they may be transmitted to another. With this knowledge one may be able to, in a measure, prevent the spread of the disease while caring for a patient.

First secure good ventilation, and do not allow the room to become too hot. When the weather is hot provide some means of keeping the air in motion; an electric fan if possible.

Absolute cleanliness is most essential. (Baths given for the reduction of temperature must never be allowed to take the place of daily cleansing bath with soap and water.) Patient should be isolated (which means he should, with his nurse, be kept absolutely by himself) or barred from others. There should be thorough disinfection of all clothing and body discharges and complete and thorough sterilization of all dishes and utensils.

Then follow the simple nursing procedures for the comfort and well-being of the patient.

Antipyretic treatment may or may not be indicated. If the disease is self-limited and of short duration, usually nothing is done to reduce the temperature, as *it is its duration rather than its degree which is serious.*

If hydrotherapeutic measures are used, the application which is least tiring to the patient should be chosen, and whenever possible the method liked best, or disliked the least. The result is much better than to persist in using some particular method, while the patient protests. (See page 236.)

Measures for Saving the Patient's Strength.—With the elevation of temperature there is always increased heart action. Conserving the heart's strength may be a considerable factor in saving life if the fever is prolonged. Consequently the patient should be kept quiet and should lie perfectly flat in bed. The position makes the work of the heart easier, while every act or effort adds to its work.

If the condition is such that the patient's head must be elevated, because of difficult breathing, the back and shoulders should be comfortably supported in each individual case. It must be remembered that *one arrangement cannot suit all persons.*

"Quiet" means no effort or *noise;* patient should not be allowed to help himself in any way; he should not be allowed to talk, nor be obliged to listen to the talk of others; above all things never let a patient hear whispering in or outside the sick room.

It is always well to remember that a patient may not be able to speak or make any sign, but may be able to hear perfectly any discussion of his condition which may be carried on in a whisper.

Quantities of Fluid.—The body is dependent upon a certain amount of fluid to functionate properly. The kidneys secrete a large portion of its waste. In disease the débris is largely thrown off by them. The kidneys do their hardest work when compelled to excrete concentrated urine. A high temperature causes a depletion of fluids in the body, and as the amount ingested materially affects the output, one should see that such patients have quantities of *fresh cold water* (not from a

pitcher with a piece of ice in it, which has been allowed to stand in a sick room for hours, or until the ice is melted). This *should be given* the patient, usually with a feeder; if breathing is difficult, as in pneumonia, with a spoon. It requires too much effort under such conditions to drink from a feeder or draw fluid through a drinking tube.

Food.—Easily assimilated foods should be given frequently and in small amounts, served as attractively as possible. It often becomes difficult to give sufficient food when exhaustion is great and breathing labored; the added effort of taking the food many times balances the benefit received. Milk, icy cold; beef juice, either hot or cold, given with a spoon; ice-cream, coffee, or cocoa, with one-third cream and sugar, either hot or icy cold, may be used under such conditions. While the temperature is high generally almost any liquid food may be used, but proteins should always be used sparingly.

In infections when the kidneys may become involved (scarlet fever, diphtheria, measles, typhoid or pneumonia), it is best to limit the protein and depend upon carbohydrates until convalescence is well established.

Constipation is usual with a high temperature; this is in a measure due to the depletion of fluids. Plenty of water with fruit juices will help; if not sufficient, drugs or enemata will be necessary to produce the daily evacuation.

Distention may accompany constipation, or exist independent of it. If it be due to constipation, an enema affords the surest relief; if to other causes, a

rectal tube may be used. Hot applications may afford relief. In any case one must have the sanction of the attending physician.

Nervous phenomena may be entirely absent or may vary from inertia to violent delirium. The control of this rests entirely with the attending physician.

Drugs or hydrotherapeutic measures may be used. Restraint should only be resorted to when the safety of the patient is involved.

The nurse should be on guard against any sudden change. One who has been in a state of semiconsciousness or suffering from a mild type of delirium may suddenly become violent and do himself or others considerable injury.

CHAPTER XXIV.

BATHS FOR REDUCTION OF TEMPERATURE.

Sponge Baths and Hydrotherapy Treatment—Cold Packs—Hot Packs—Hot Air—Nauheim Baths.

COLD or cool baths may be given in the tub, by sponging in bed, by spraying or showering and by cold packs.

The degree of coldness should depend upon the condition of the patient: his circulation, degree of temperature, and susceptibility to antithermic treatment.

The method used should be that which causes the least possible fatigue to the patient.

Baths for the reduction of temperature should be given in such a way that they not only abstract heat from the body, but also lessen the heat production. This result is best obtained by means of friction; by this method the superficial vessels are dilated and the active movement of the blood is maintained.

Cool rather than cold bathing is, as a rule, the more effective, as the reaction which often results in heat production rather than heat elimination is lessened; also the possibility of shock from extreme cold is eliminated. The essential point is to have the water of the bath several degrees lower than the temperature of the patient and to maintain that degree all through the bath; or it may be gradually decreased according

to existing conditions. 95° F. is a safe degree to maintain, or it may be gradually reduced to 85° F. without ill effects. In either case the bath should be continued long enough to produce a decided effect upon the temperature of the patient, twenty minutes or one-half hour at least.

The length of the bath, rather than an excessively cold one, is of vast importance in the reduction of temperature. It is also essential that it should not cause any degree of exhaustion, consequently it is best given in the form of a sponge bath in bed.

To prepare for a sponge bath, first protect the bed with a rubber sheet covered with a wool blanket, upon which the patient is to lie. Have at the bedside water at the required temperature (92° to 95° F.); a bath thermometer should stand in the water, so that the degree of temperature may at all times be watched; a basin with a piece of ice, upon which the sponges are to be cooled; an ice-cap for the head; a heater well covered, to use in case of necessity (if the patient shivers, if the extremities become cold, and if there is pallor or cyanosis); two towels and several sponges[1] are also necessary.

A towel should be folded diagonally, wetted, and laid across the abdomen, and the corners tucked between the thighs.

Pieces of gauze (or a sponge prepared for the purpose) should be wetted and placed around the neck, also one in each hand and in the axillæ.

[1] Sponges should be made of several thicknesses of gauze, sewed together, and kept for bathing only.

The face should be bathed first, the sponges to be cooled on the ice before they are returned to the bath-water; then with a sponge in each hand the attendant should begin at the feet and with one long sweep, sponge up the legs and arms and down across the chest, making the sponges follow the course of the venous return.

Sufficient friction should be made to keep the body a pink color. If the skin suddenly becomes pale or blue the bathing should cease.

Towels and sponges should be changed frequently, first cooling them on the ice before they are returned to the water.

The patient should be bathed first while lying on the back, then turned on the side so that the back can be bathed.

The bath should continue at least twenty minutes. He should then be covered with a dry blanket and allowed to rest one-half hour. The water should be allowed to evaporate from the surface of the body, but not dried with a towel.

Alcohol baths may be given in the same manner. The alcohol should be diluted 50 per cent. by the addition of water sufficiently warm to bring the temperature up to 95° F.

Whatever method is used, cold baths for reduction of the temperature should always be accompanied by friction.

The Cold Pack.—The bed should be protected with a rubber sheet. Two sheets wrung out of water of the required temperature should be placed one under and one

over the patient, care being used to allow no two surfaces of the skin to come together. An ice-cap should be applied to the head. It is seldom necessary to have a heater for the feet. When one is used it should be only moderately warm (about 110° F.).

The patient should remain in the wet sheets, which should be exposed to the air for twenty minutes, and if evaporation takes place so rapidly that they become dry, they should be sprinkled or wetted a second time.

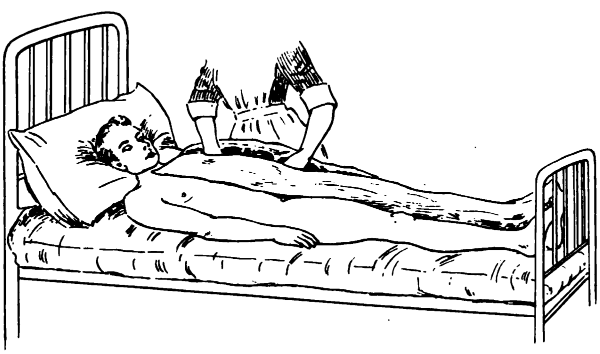

FIG. 40.—Method of applying sheet in a cold pack.

After a rest of one-half hour between dry blankets, a bed-gown may be put on and the temperature taken.

The good results expected from cool or cold baths, in the order of importance are:

1. Improve or equalize circulation (this may be partially accomplished by the prolonged bathing—twenty minutes to a half hour).

2. Reduction of temperature, due to improved circulation.

3. Allay nervous conditions.
4. Finally to promote sleep, a patient who rests after a bath even though the temperature has not been reduced, is benefited by the bath.

Bad results are shock and elevation of temperature.

Danger signals are change in color (either pallor or cyanosis). Change in rate or quality of the pulse, sighing or gasping respirations, shivering.

When any of the above symptoms develop during the process of bathing, the bath should be stopped at once, heaters and blankets applied and doctor notified.

The Hot Pack.—The bed should be protected as for a sponge bath. The patient should lie on a dry blanket. One large wool blanket (or two if the blankets are small) should be wrung out of water at a temperature of not less than 140° F. This should be done with a wringer so that the blankets will not drip, and carried to the bedside in a covered pail.

The patient should be turned on the side and the wet blanket slipped under him and brought around the whole body, being careful that it is well tucked in around the neck. The dry blanket is then brought up over the wet one and securely pinned. Several dry blankets are put over all. Heaters should be put to the feet, also one on each side. They should be filled with water not over 110° F., well protected and placed outside at least one dry blanket, making sure that they are far enough away from the patient that burning cannot occur.

An ice-cap should be kept on the head and cold

water given frequently (about four ounces every ten minutes) during the pack, which should continue from twenty minutes to a half hour.

When removing the wet blankets, it should be done with the least possible exposure, and the patient left in warm, dry blankets for one-half hour; then he should be rubbed dry with a bath towel.

The effect is to communicate heat to the body, promote heat production, and decrease heat elimination. The temperature and pulse are increased, and when prolonged for twenty minutes or a half-hour, profuse sweating occurs.

Hot packs are valuable in Bright's disease, and in acute nephritis, which so frequently complicates the infectious diseases, edema, uremic coma, albuminuria, and eclampsia of pregnant women.

Hot-air baths are given for any of the above conditions, though much less frequently than hot packs.

The bed should be prepared as for a pack, and the patient securely pinned in a blanket; two cradles are placed over the patient, one over the chest and the other over the legs; these should be covered with rubber and blankets, making a rubber-lined tent in which the patient lies; blankets which come closely about the neck of the patient are then securely tucked in on the sides. An open space should be left at the foot, through which is passed the funnel of the hot-air apparatus.

An ice-cap should be kept on the head and frequent drinks of cold water given. If pallor or cyanosis occurs the treatment should be discontinued.

A thermometer may be placed under the canopy

to register the temperature of the bath, which should not exceed 120° F.

Patients should never be left alone while having a hot pack or hot-air bath. A hypodermic syringe and stimulants of various kinds should be at hand ready for use in case of emergency.

Hot packs may be supplemented by hot air when prolonged moist heat is desired.

There are many forms of medicated baths given under varying conditions, as the bran bath, used in skin disease, the saline, bicarbonate of soda, etc.

The Nauheim Bath.—The Nauheim bath is of most importance. It is an effervescent bath given at the famous resort, Nauheim, Germany, from which it receives its name. It consists of a full bath of the natural mineral water, which is charged with carbonic acid gas, and contains a large amount of calcium chloride in solution.

Its effect is to stimulate the superficial circulation to a high degree. In this way deep-seated congestion is relieved and the work of the heart considerably lessened. The action of the skin is also increased, lessening the work of the kidneys.

In this respect the Nauheim bath, at the temperature of the body, has the same effect as a hot bath, and the extreme temperature is avoided. This is important in cases of weak heart and in chronic nephritis.

This bath given by a skilled person produces excellent results. It may be used in cardiac conditions when there is dilatation and dropsy, and also in nephritis.

The dropsy gradually disappears and the heart's action is improved.

The baths are usually given on alternate days until three or four have been given, then not for two or three days; they may be gradually increased in number until four are given on successive days. The patient should not be allowed to get exhausted. In heart disease the breathing should be normal when the patient is put in the bath. Friction must be used. The patient should never be left alone.

Artificial Nauheim salts, in packages with directions for using, can be procured from most druggists.

Inexperienced or unskilled persons should never undertake to give a Nauheim bath unless supervised by a physician.

CHAPTER XXV.

TRANSMISSIBLE DISEASES.

Modes of Transmission—Immunity.

INFECTIOUS AND CONTAGIOUS DISEASES.

DISEASE is any mental, moral, or physical disorder.

Infectious diseases are those caused by entrance into the body of small, living organisms of either plant (bacteria) or animal (protozoa) life. As a rule, the organisms which produce disease are dependent upon other living bodies for existence. The large majority of those that infect man are able to live only a limited period outside the human body.

The transmission of disease in most cases is dependent upon contact either directly with the infected person or with material recently cast off from such an individual.

Contagious diseases are always infectious and differ only in the mode of transmission, which may be by *direct* or *indirect* contact. They may be transmitted by a third person or anything which has come in contact with the infected individual.

In several of the contagious diseases the infectious element has not been discovered—smallpox, scarlet fever, measles, etc. It is possible the infecting agent is contained in the discarded epithelial cells, the excreta, or discharges from the nose and throat.

MEANS OF SPREADING DISEASE.

1. By carriers.
2. By contact (direct and indirect).
3. By infected objects.
4. By insects.
5. By air.
6. By food and drink.

1. **Carriers.**—Carriers are persons carrying in their bodies the bacteria which produce disease, but who show no sign of having the disease. The person frequently has had the disease and produced an immunity to it, so the bacteria do him no harm, but he may infect others. These means of spreading disease are important in diphtheria, typhoid, and gonorrhea.

2. **Contact Infection.**—Contact infection is infection caused by coming in direct contact with a diseased person (actually touching him) or by touching objects or persons who have recently come in contact with him. This is the most common method of spreading disease. The diseases usually contracted in this manner are scarlet fever, diphtheria, measles, typhoid, gonorrhea and syphilis.

3. **Infected Objects.**—Infected objects, such as clothing, bedding, or furniture, which have been in contact with diseased persons days or weeks, may spread disease. Spreading disease by infected objects is important in the spore-forming bacteria, such as tetanus and anthrax. Tuberculosis, scarlet fever, diphtheria, and typhoid may be spread in this manner.

4. **Insects.**—Flies are the most common insects that carry disease in this part of the world, typhoid being one of the principal ones. Malaria and yellow fever are carried by mosquitoes; bubonic plague by fleas.

5. **Air.**—Bacteria may become dried and be blown about in the dust, or may be scattered from an infected person by coughing or sneezing. This manner of transmission is not common and is unimportant except in tuberculosis and measles, which are sometimes spread in this way.

6. **Food and Drink.**—Uncooked foods, milk, fresh vegetables, and shell-fish sometimes contain disease-producing bacteria from infected persons or materials with which the foods have come in contact. Milk may spread typhoid, diphtheria, or tonsillitis. Infected water supplies from reservoirs or wells may produce epidemics of disease, especially typhoid, cholera, and dysentery. The most common manner of spreading disease is by carriers and by contact.

IMMUNITY.

All the higher forms of life are susceptible under certain conditions to the invasion of parasites of various forms; also some degree of resistance to this invasion is manifested by all animals and plants. In some instances this resistance or defence is so complete that bacteria and other organisms rarely infect the body under normal conditions. This power of defence is called immunity.

Resistance to certain forms of bacteria is often the natural possession of a race or of an individual. The resistance is a natural immunity which depends upon the fact that certain disease-producing organisms find unfavorable conditions for reproduction and growth in one animal or person and suitable conditions in another.

There is also a condition the exact opposite to this, a natural susceptibility. Most children are susceptible to scarlet fever, measles, etc., but later in life acquire a certain degree of immunity by having had the disease (acquired immunity).

Acquired immunity may be active or passive.

Active immunity depends upon the activity of the body cells and their power to produce a certain substance which counteracts the toxin produced by the bacteria and in some instances renders them inert or kills them.

This antitoxic substance is only produced in response to the presence of the organism in the body, and is the direct result of its stimulation.

Active immunity may be acquired in several ways:

By the injection of attenuated organisms, or those which have been rendered less virulent by passing through other animals. A familiar example of this is smallpox vaccine.

By the injection of dead organisms.

By the toxin produced by certain of the organisms.

The injection of living bacteria is said to produce a higher degree of immunity than the attenuated or dead microörganisms.

Passive immunity is acquired by the injection of the antitoxin produced in the body of other animals which have been rendered immune by any of the above methods.

Vaccines produce active immunity.

Antitoxins produce passive immunity.

GLOSSARY.

Abrasion. A break in the skin or mucous membrane.

Abscess. A collection of pus.

Acetone. An easily evaporating liquid with a characteristic odor found in the urine of many cases of diabetes.

Acute Disease. A disease of short duration.

Adhesion. The adhering of two surfaces.

Adrenalin. That substance to which the secretion of the adrenals owes its ability to contract the bloodvessels powerfully.

Aërobic. Preferring or demanding atmospheric oxygen for life.

Affinity. Attraction.

Affusion. A pouring upon, or sprinkling.

Ameba. One of the simplest protozoa, without membrane and which moves by means of pseudopods; it is very common in fresh water.

Amputation. The cutting off of a portion of the body.

Anaërobic. Preferring or demanding the absence of atmospheric oxygen for life.

Anemia. A deficiency in the amount of hemoglobin or of red blood corpuscles in the blood, or in the amount of blood.

Anesthesia. Condition in which sensation is lost.

Ankylosis. Stiffness of a joint, due to adhesions.

Anodyne. A medicine that relieves pain.

Anterior. Toward the front of the body.

Antibodies. Substances developed in the blood serum which neutralize extracellular toxins of bacteria.

Antiseptic. Preventing the growth of bacteria.

Antitoxins. Antibodies developed in the blood serum which neutralize extracellular toxins of bacteria.

Aphasia. Partial or complete loss of the power of speech.

Aphonia. Loss of voice.

Apoplexy. Sudden paralysis generally caused by ruptured bloodvessel in the brain.

Arthritis. Inflammation of a joint.

Ascites. An abnormal collection of fluid in the abdominal cavity.

Asepsis. Free from septic matter.

Asphyxia. Suffocation.

Aspiration. Withdrawing of fluids from the body by means of an aspirator.

Atony. Lack of power; weakness.

Atrophy. A wasting away.

Attenuate. To reduce in virulence.

Auditory. Of hearing; pertaining to hearing.

Auscultation. Listening to sounds produced in the body, usually of the heart and lungs.

Autoclave. Instrument for sterilizing by steam under pressure.

Bacillus (pl., Bacilli). Rod-shaped bacteria.

Bacteria (sing. Bacterium). Unicellular microscopic, vegetable organisms.

Bacteriology. The study of bacteria.

Benign. Not malignant; mild.

Bistoury. A narrow-bladed knife.

Blood Casts. Abnormal microscopic bodies found in the urine; mould of the tubules of the kidneys formed of blood cells.

Bougie. An instrument used to dilate the urethra and other canals.

Bronchitis. Inflammation of the living mucous membrane of the bronchial tubes.

Calculus. A stone-like concretion found in the body.

Callous. Hard.

Callus. A new deposit about a fractured bone, formed in the process of repair.

Calorie. A heat unit; the amount of heat necessary to raise the temperature of 1 gram of water 1° C.

Cannula. A small tube, usually of metal.

Carbohydrate. The chemical term applied to one of that group of substances which includes all sugars and starches.

Carbon Dioxide. A gas consisting of carbon and oxygen, and an important constituent of exhaled air.

Cardiac. Pertaining to (1) the heart or (2) the cardia of the stomach.

Caries. Local death of a bone.

Carrier. A term applied to a person who carries germs capable of being transmitted to and infecting others, but himself not necessarily suffering at the time from the disease caused by the germ.

Cathartic. A drug to move the bowels; a purgative.

Catheter. A tube to be introduced through a canal into a cavity in order to empty it, the bladder, renal pelves, middle ear, etc.

Caustic. A substance which destroys tissue (burning).

Cautery. Any hot metal instrument used to burn or to irritate tissue.

Centimetre, Centimeter. The hundredth part of a metre. It is equal to 0.39 inch.

Cheyne-Stokes Respiration. An undulating type of breathing.

Chronic. (1) Of long standing; (2) a term describing conditions which are the results of acute processes.

Cilia. Short hairs which some cells possess. In the case of certain protozoa these hairs are their means of locomotion.

Coaptation. The adjustment of the edges of a wound or fractured bone.

Collapse. Complete prostration of the vital powers.

Coma. Unconsciousness from which the patient cannot be aroused by external stimuli—shaking, shouting, etc.

Comatose. In a state of coma.

Comminution. Breaking into small pieces.

Communicable. Contagious.

Congenital. Existing at or dating from birth.

Congestion. An abnormal accumulation of blood in any part or organ.

Conjunctiva. The covering of the eye-ball and lining of the eye-lids.

Contagious Disease. Any disease which can be directly communicated from the patient to those about him.

Convulsion. An unnatural, violent and involuntary contraction of the muscles.

Counter-extension. Opposing traction upon a limb in extension.

Crepitus. Grating of the ends of broken bones.

Crisis. A sudden change; the turning-point in disease.

Culture. The mass of bacteria grown artificially upon laboratory foodstuffs. The general term applied to the way bacteria grow.

Debris. Fragments; rubbish.

Dejecta. The feces and urine; also used to mean sputum, sweat and morbid discharge.

Delirium. A disordered mental condition with excitement and illusions.

Dementia. Loss of reasoning power.

Desquamation. A peeling off of the skin.

Diagnosis. The recognition of a disease by its signs and symptoms.

Dicrotic. A kind of pulse characterized by a double beat.

Disease. A disturbance of the function or structure of any part of the body.

Disinfect. To free from organisms (bacteria, etc.); to make innocuous.

Dyspnea. Difficult breathing.

Edema. Accumulation of fluid in the cellular tissues.

Emaciation. The state of being emaciated.

Embolism. A clot or other obstruction in a bloodvessel.

Emesis. Vomiting.

Emollient. An agent that softens or soothes.

Enema. A rectal injection.

Enzyme. The products of life of organisms by which they digest their foodstuffs. A substance capable of splitting others into simpler ones without itself undergoing any change of entering into the new product. Also called ferment.

Epidemic Disease. A disease affecting large numbers of persons at the same time.

Excision. A cutting out.

Excoriation. Abrasion of the skin.

Excreta. Waste products discharged from the body.

Extension. Traction upon a fractured or dislocated limb.

External. (1) On the surface of the body; (2) removed from the midline of the body.

Exudation. The oozing of fluids.

Febrile. Characterized by fever.

Feces, Fecal Matter. The discharge from the bowels.

Ferment. Any substance (*e. g.*, pepsin) or organism (*e. g.*, yeast) which can break up a complex substance into simpler substances.

Filter. To pass a liquid through a cloth or porous paper in order to strain out solid particles.

Fixation. Making rigid.

Fomites. Substances capable of absorbing contagion.

Function. The normal or special action of a part.

Gangrene. Mortification or death of a portion of tissue.

Gastric. Pertaining to the stomach.

Gastro-intestinal. Pertaining to the alimentary canal.

Germicidal. Capable of killing germs.

Gram, Gramme. The unit of weight in the metric system. It is equal to 15.43 grains, and is the weight of 1 c.c. of distilled water at 4° C.

Granulations. New cell growth.

Grape-sugar. Glucose.

Hallucination. A false sense perception. The patient sees, hears or smells, etc., that which does not exist.

Hemorrhage. An escape of blood from the bloodvessels.

Hemorrhoids. Piles. Enlarged and varicosed veins, especially of the rectum.

Hemostatic. An agent that arrests hemorrhage.

Hernia. An abnormal opening in the walls of any of the cavities of the body into or through which portions of organs protrude.

Host. The body which carries a parasite.

Hydrolysis. The splitting-up of a complex substance by introducing water into molecules.

Hydrotherapy. The treatment of disease by the use of water (bathing is usually meant).

Hyperacidity. Excessive acidity.

Hyperpyrexia. Excessively high body temperature (*i. e.*, over 106° F.).

Hypersensitive. Over-acute sensitiveness.

Hypertrophy. An abnormal increase in the size of a part or organ.

Hypedermic. Introduced under the skin.

Hypodermoclysis. The giving of salt solution under the skin.

Hysterical. Resembling, but not necessarily due to, hysteria.

Idiopathic. Without known cause.

Idiosyncrasy. Individual peculiarity.

Immune. Protected: immune bodies are substances within our organs or blood which protect us against a given disease.

Impacted. Wedged in.

Incontinence. Involuntary evacuation of urine or feces.

Incubation. The period which intervenes between the implantation of the virus and the development of the disease.

Infective. Any material carrying disease viruses.

Infiltrate. To ooze into the spaces of a tissue.

Inflammation. Response of living tissue to injury.

Infusion. The product obtained by extracting the active principles of a substance by water without boiling.

Inhibit. Restrain, limit.

Inoculate. To introduce a virus into the body.

Inorganic. In chemistry an inorganic substance is one which contains no carbon.

Intermittent. Occurring at intervals.

Internal. Situated within; on the inside.

Interstitial. Situated in the interspaces of a tissue.

Intestine. The alimentary canal from the pylorus of the stomach to the anus.

Intubation. The introduction of a tube.

Inunction. The act of rubbing in an ointment.

Isolate. Used to indicate the procuring of germs from morbid fluids or to the obtaining of a single kind, a pure culture, usually by finding a type of colony. Related word: isolation.

Laceration. Tearing.

Lavage. The washing out of an organ (as the stomach, bowel, etc.).

Lesion. Used to indicate any physical change from normal.

Ligature. A cord or thread for tying arteries, etc.

Litmus. A coloring matter used to distinguish acids and alkalies.

Livid. Congested; pale lead color.

Lumen. The space inside a tube.

Lysis. The gradual decline of a disease.

Malaise. A general feeling of illness.

Malignant. Virulent; threatening life.

Mania. A form of insanity marked by great excitement.

Medium (pl. Media). General name given to foodstuffs upon which bacteria are grown artificially.

Medulla. The marrow.

Meningitis. Inflammation of the membranes of the brain.

Microbe. A microörganism.

Micrococcus. A spherical-shaped bacterium.

Microscopic. Not visible to the naked eye.

Motile. Able to move.

Mucous. Containing, resembling or producing mucus.

Mucus. The sticky liquid which the mucous membranes secrete.

Narcotic. Producing stupor.

Nares. The nostrils; the openings into the nose in front and behind into the throat.

Nausea. The sensation which makes one wish to vomit.

Necrosis. The death of tissue.

Nephritis. Inflammation of the kidneys.

Neurasthenia. Exhaustion of nerve force.

Normal. Typical; conforming to the natural order or law.

Occlusion. Sealing or blocking up.

Œdema. A swollen condition of a part, due to a great increase in the fluid it contains within its tissues.

Œsophagus. The tube through which the food passes from the mouth to the stomach; the gullet.

Ophthalmia. Inflammation of the conjunctiva.

Organic. A substance having the form, the chemistry or some characteristics of living matter; example, egg white.

Organic Compound. The chemical term for a substance containing carbon.

Osmosis. Diffusion of fluids through membranes.

Otitis Media. Middle-ear disease.

Paralysis. A loss of motion or of sensation in a part.

Parasite. An animal or vegetable which lives in or on, and at the expense of a larger animal or vegetable, called the host.

Pasteurization. Checking decomposition by heating.

Pathogenic. Disease-producing.

Percussion. Light tapping on any part of the body for diagnostic purposes.

Peristalsis. Undulating movements of the intestines.

Poisons. Used generally to indicate any substance dangerous to the body.

Premonitory. Forewarning.

Prognosis. The prediction of the course and termination of a disease.

Prophylaxis. Prevention of disease.

Protozoan. One of the simplest animals, consisting of but one cell.

Pseudo. False, resembling.

Ptomaine Poisoning. Infection of the intestinal tract by the products of decomposition; usually of food.

Putrefaction. The decaying of proteid, with production of foul odors and poisonous substances.

Pyogenes. Pus-producing.

Pyuria. A condition marked by pus in the urine.

Rash. A skin eruption.

Reaction. Recuperation or return of power after depression.

Recurrent. Returning at intervals.

Relapse. Recurrence of disease before complete convalescence.

Remittent. Alternately abating and returning.

Renal. Pertaining to the kidney.

Resolution. The return of a diseased part to its natural state.

Retching. Attempts at vomiting.

Saline. Salty.

Salt. (1) Any compound of a base and an acid; (2) sodium chloride or table salt; (3) a saline laxative, as Epsom salts.

Scar Tissue. Fibrous tissue which develops to repair an injury.

Scurvy. A disease resulting from a long-continued diet which lacks fruits and fresh vegetables.

Secondary. Due to a known cause.

Self-limiting Disease. A disease which runs a definite course, independent of treatment.

Septic. Relating to putrefaction.

Serum. The clear yellow fluid part of the blood which exudes after clotting has occurred, and in which antibodies reside.

Spirocheta (pl. Spirochetæ). The spiral or corkscrew-like organisms; name given both family and genus.

Staphylococcus. The spherical coccus which grows in grape-like masses.

Streptococcus. The spherical coccus which grows in chains.

Styptic. An astringent that will check hemorrhage.

Subnormal. Lower than normal.

Suppression. The sudden cessation of a secretion.

Suppuration. Inflammation with pus formation.

Symptoms. Those evidences of disease which are conspicuous.

Tachycardia. Excessive rapidity of heart action.

Tap. To empty of fluid.

Thermic. Pertaining to heat.

Thrombus. A blood clot in a vessel forming an obstruction.

Torsion. Twisting.

Toxemia. A condition in which the blood is poisoned by the poisons of germs, not by the germs themselves. (The latter is called septicemia.)

Toxins. The poisonous products of bacterial life.

Traction. Drawing or pulling.

Traumatic. Produced by injury.

Tumor. (1) A swelling; (2) an abnormal mass formed in the body by a growth of tissue which does not belong there.

Tympanites. The accumulation of gas in the abdomen.

Typhoidal. Resembling, but not identical with, typhoid fever.

Ulcer. A cavity on the skin or on a mucous membrane which is left when there is death and sloughing off of a tissue.

Urticaria. Hives, or a skin eruption of like nature.

Vaccine. Originally used for the inoculation of cow-pox as a protective against smallpox; now used for that and for the injection of dead or attenuated bacteria for active immunization or treatment during disease.

Vascular. Well supplied with bloodvessels.

Vesicle. A blister.

Viable. Capable of living and reproducing.

Virulence. The power possessed by organisms to develop poisons and produce disease; it varies in different strains, but depends also upon the resistance of the host.

Virus. Any factor which produces disease, either individually recognized or obscure; usually applied to poisons not specifically isolated, like rabies virus.

Viscid. Glutinous.

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